

The AUTOMOBILE

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80% More Power

Marks the Wonderful
Supremacy of the

Hudson Super-Six

Patented by Hudson
December 28, 1915.
Patent No. 1165861



\$1375
at Detroit

Eights and Twelves Defeated by a Six

THE facts about the Super-Six seem almost like fiction.

Think of increasing motor efficiency 80 per cent at one jump without adding size or cylinders.

Think of a small light Six—cylinders $3\frac{1}{2} \times 5$ —developing 76 horsepower.

Think of that Six, in official tests, breaking all stock-car records.

Think of a simple, light-weight Six out-matching Eights and Twelves.

And think of a \$1375 car proving itself, beyond possible question, the best performing car of the day.

MEN WILL HAVE THAT 80%

This motor's capacity is 288 cubic inches. The best former motors in that size delivered about 42 horsepower. The Super-Six delivers 76 horsepower.

Any motor which shows about half that efficiency will have no attraction now.

This extra 80 per cent means more than added reserve power. It comes through ending vibration. All this super-efficiency comes through saving power which former motors wasted within themselves.

So it means vast economy. It means such smoothness as you never have known before. It means matchless flexibility. It means, as shown by official tests, record quick response.

Every quality men prize in a motor has been bettered vastly in this Super-Six.

EXCLUSIVELY HUDSON

Now, for the first time, a premier attraction is found in one car only.

The Super-Six is a Hudson invention controlled by Hudson patents. So no other car will have it. And any like performance is impossible without it.

Eights and Twelves of the finest types have been utterly defeated. Every reason for a double motor, with its extra weight, has vanished. Not a Six of the old type has any chance in comparison.

So this invention gives the palm to Hudson, over all cars in the field. One ride in the Super-Six will convince you of that.

\$42,000,000 OUTPUT

We have doubled our factory because of this invention. And we shall build this season \$42,000,000 worth of these Super-Sixes.

They come equipped with most luxurious bodies. All that we save by this doubled production has gone into extra elegance.

So the Super-Six will stand supreme both in motor and in looks. Any Hudson dealer stands ready to prove that to your fullest satisfaction.

7-Passenger Phaeton, \$1375 at Detroit.

Five Other Body Styles.

Super-Six Catalog Is Ready.

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World's Record Breaker

All Records up to 100 Miles

These tests were made at Sheepshead Bay with a 7-passenger Super-Six—a touring stock car—under official supervision of American Automobile Association.

100 miles in 80 min., 21.4 sec., averaging 74.67 miles per hour, with driver and passenger.

75.69 miles in one hour with driver and passenger.

Two laps made at 76.75 miles per hour.

Standing start to 50 miles per hour in 16.2 sec. A new record in quick acceleration.

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—on the demand for Stewart products. Hundreds of car owners in your vicinity see and read Stewart advertising. They want Stewart Products—are going to get Stewart Products—will insist upon Stewart Products. The only question is—are *you* going to be the one to make the profits by cashing in on this Stewart demand?

You don't have to "push" Stewart Products—they move easier than any accessories on the market—they are half sold to the public before they reach you.

Then why gamble with other goods, when you know Stewart Products are wanted?

Why risk your reputation in handling inferior goods when you know the demand is for Stewart Products?



*Can be installed on
any car—old or new*

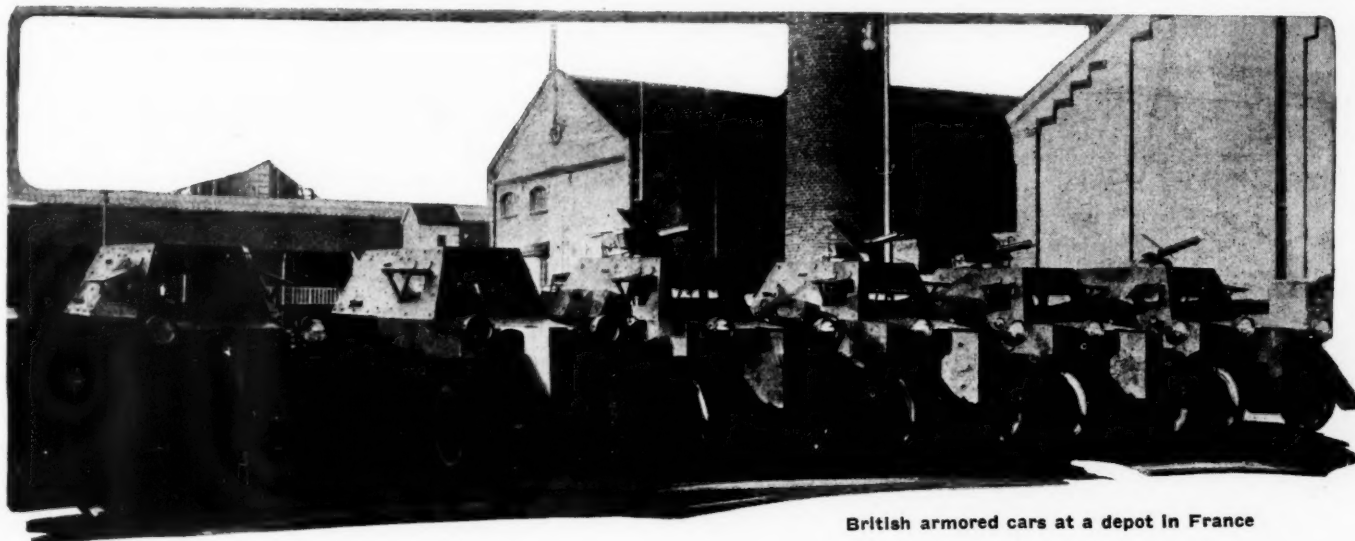
Stewart Vacuum Gasoline System

Any dealer can put this system on any old car and thereby bring it up-to-date. It has put back into the running more old cars than any other feature ever offered the automobile public.

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Stewart-Warner Speedometer Corporation, Chicago, U. S. A.

The AUTOMOBILE



British armored cars at a depot in France

British Use Many Armored Cars

Varied Chassis With All Degrees of Armament Tried—How French Army Service Affects Trucks—Detail Design Could Be Stronger

By W. F. Bradley

Special European Representative of The Automobile

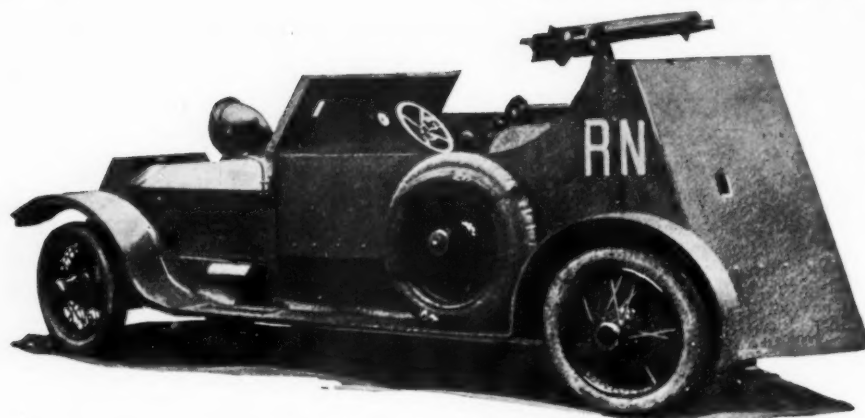
THERE are few types of automobiles which have not been made to carry a gun or guns. The range varies from a motorcycle sidecar with a light machine gun, to a 5-ton truck with a marine weapon aboard. They all look good in maneuvers, and they all appear convincing on specially selected ground, but when they are submitted to the crucial test of war, there are some deceptions. There is no necessity to argue the value of automobile guns, for everybody is convinced on that point; the problem is to arrive at the most suitable type, or types, for it is obvious that one machine cannot meet all the varied conditions of war.

The motorcycle with a third wheel attached so as to make it possible to carry a gun and an extra passenger, has the advantage over the unmounted machine gun sections of greater speed and less visibility. They are of necessity limited to two men, who are a more difficult target than the half dozen in the unmounted sections. Their ability to operate away from made roads is not very much greater than that of a car, and under present conditions of trench warfare there is not great scope for them, for they cannot get into positions attainable by the man-carried guns. Probably owing to this, and to the fact that they cannot give the men

the advantage of armor plating, they are not used to any great extent by any belligerents in the field.

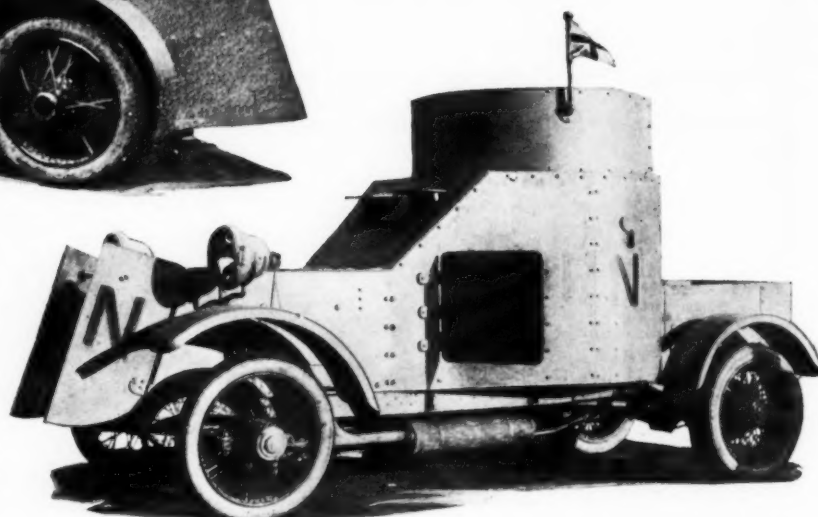
Every type of touring car, up to the 60-hp. semi-racer, has been made to carry a gun. In the early stages of the war numbers of ordinary touring cars were taken out of private service, equipped with a machine gun and sent to the front without any plating being added. It is hardly necessary to explain that such a machine could not go into an exposed position with any reasonable hope of returning in safety.

As soon as it was possible to do so, these cars were armored, although not very effectively at first. It is a rather curious fact that when the war broke out no armored cars existed in the Allied armies, although Germany appears to have had some. On page 260 is a good example of one of the earliest armored cars to be put into service by the British. This is a standard Rolls-Royce, which had been used for touring purposes by the officer in charge of it. A louvred guard was built in front of the radiator; a steel windscreen replaced the usual glass appliance, and a machine gun was mounted in the tonneau in such a position that it could be raised above the pointed steel stern. By crouching low, the



Left—A familiar type of armored car used by the Royal navy in France

Below—One of the earliest types of armored cars to be used in France. It has a Rolls-Royce touring chassis



driver and gunner could get a certain amount of protection, but there was always a certain amount of danger of the driver being winged. In this car no attempt was made to protect the tires or the motor. Although this type of car did good service in the hands of a daring crew, it would not be considered a safe or up-to-date machine at the present.

A further development is shown on page 261. This is also a Rolls-Royce chassis, but unlike the earlier car, is completely armor-plated, the side panels being flush with the outside of the wheels and the upper portion of the body being the frustrum of a pyramid. The upper base of the frustrum is hinged so as to allow a machine gun to be raised above the top of the body, and there are hinged doors in the sides of the pyramid. Two hinged panels are carried in front of the radiator, and capable of being opened or closed from the driver's seat. With this amount of plating it became necessary to fit twin pneumatic tires on the rear wheels. It is worth noting that no armored car has been able to work successfully with single pneumatics on the rear wheels. Some protection is given front tires by steel fenders which tend to deflect bullets. This type of car trails a special gun carriage and a naval gun, the carriage having automobile-type wheels and twin tires. This is a development of particular interest. An automobile of this type is quite capable of dealing with the extra load.

Four Cylinders Adequate

Most high-grade automobiles with four-cylinder motors of 4 by 6 in. bore and stroke, or the equivalent, have proved satisfactory for armored-car work. With an adequate front radiator and good capacity pump overheating troubles are not experienced, despite the plating. Many cars have gone into service without other mechanical modifications than the reducing of the gear ratio; double steering is a refinement, though not always adopted. Armament generally consists of a machine gun, and sometimes of a 1-in. gun in addition, mounted in a turret and capable of being fired without the gunners exposing themselves. Best results have been obtained when these cars have worked together in squadrons.

It was to be expected that attempts would be made to use comparatively heavy guns on automobile chassis. In the early stage of the war the London motorbus B-type chassis was made to carry a powerful naval gun, the car being without any armor plating. This experiment was a failure, the springs being unable to withstand the recoil of the gun. It is doubtful if any other bus or truck chassis would have proved any better.

Probably the only really successful use of an automobile for carrying a field gun is the special De Dion Bouton chassis with the famous 75-mm. gun. The chassis approximates the firm's 3-ton truck model, but the feature is the system of jacks allowing the entire load to be taken off the springs, and giving the vehicle the same amount of rigidity as the ordinary

gun chassis. This is a type of automobile developed before the war and used very extensively and very successfully at the present time. These cars carry sufficient armor plating to protect the crews against rifle bullets, and each gun car is served by 3-ton trucks carrying ammunition. These ammunition cars have armor plating for the motor and have the gasoline tank set within a steel box between the rear of the frame members. Thus the tank is incased on all sides and along the bottom, while the body prevents it being hit from above. No armor plating is used for other parts of the truck.

On certain portions of the front numerous Pierce 5-ton trucks, with heavy armor plating are fitted with anti-aircraft and other types of guns. One disadvantage experienced with heavy armor plating is the extreme rigidity imparted to the chassis. It appears necessary to secure a method of attachment which will allow the chassis to maintain the degree of flexibility for which it was originally designed.

Green drivers are not the only enemies of the automobile. Many engineers and experts in various branches of military operations when allowed to apply their special knowledge to the automobiles can ruin a car before it ever goes into service. Naval engineers, for instance, have a lot to do with armored automobiles and almost invariably fail to realize that weight is an important factor on the road. This is doubtless due to the fact that aboard ship they are not usually restricted in any way by considerations of weight.

Overloading Common

There was a good example of failure to appreciate this important factor in two special armored cars which were sent from England to France, recently, for experiments at the front. The standard Pierce-Arrow 5-ton chassis had been transformed into an armored car to carry a 6-pounder gun. Each chassis was fitted with a big bed plate, about 4 ft. 6 in. in length, the full width of the frame, and 1 in. deep. Under this was a very heavy structure of I-beams, placed about 1 ft. apart, and below this another heavy bed plate, similar to the upper one. It was intended that when the gun car had taken up a suitable position big wooden, metal-faced wedges should be driven between the lower bed plate and the ground, thus providing an absolutely rigid mounting for the gun, and of course relieving the car springs of any reaction. In this car

the interesting feature for the automobile engineer is that the naval officers appeared to have failed to realize that they were piling up weight in an extraordinary manner. The armor plating weighed between $3\frac{1}{2}$ and 4 tons, the mounting $2\frac{1}{2}$ tons, the gun about the same; the weight of ammunition, stores, supplies and accessories, is not known. But when the truck was put on the scales, without its full equipment, it was found to weigh more than 12 tons.

Under such conditions it was to be expected that there would be trouble from the first. All the springs flattened; one of the cars had a $\frac{1}{4}$ -in. twist in every universal coupling back of the transmission, and the main shaft was sprung $\frac{1}{8}$ in., so that it was impossible to move first or reverse without a heavy hammer. It is surprising there were no broken teeth in the transmission or rear end. Before the car could go into service it was necessary to hack away a lot of metal which at one time had been considered necessary and to reduce the weight to a reasonable quantity.

Trucks Need Protection

The most obvious defect of automobile trucks put into military service is the lack of protection against collision. In many of the repair shops at the front about 50 per cent of the truck casualties are caused by trucks bumping into the machine ahead, when operating in convoy formation. Usually the officer in charge precedes the convoy in a light touring car, and unless he is a really experienced man he will set up too fast a pace. Each driver tries to keep as close as possible to the man ahead, with the result that when a sudden stop has to be made radiators are smashed in and sometimes damage is done as far back as the third cylinder.

It is not every officer who is capable of handling a big convoy in a satisfactory manner—maintaining a reasonable average, insisting on the regulation space between each truck, and at the same time being prepared if any man falls out owing to mechanical trouble. The officer who knows his business puts a skilled driver on No. 1 truck—a man who can differentiate between 12 and 14 m.p.h.—and a good mechanic on the last unit of the convoy. As it is forbidden to pass the truck ahead, the correct average can be relied on whether

the officer remains in front or falls behind; if there is a breakdown the last man is often able in a few minutes to give assistance which will save hours.

American Trucks Protected

Some of the American trucks sent into France looked as if they had all the radiator protection that could be desired. Packards, for instance, have a very substantial buffer, and the Pierce trucks are also well protected. But for present army conditions even these good examples are ineffective. It has now become the practice to fit locomotive-type spring buffers front and rear on all trucks going into active service in France. Velie trucks, which are among the latest to be adopted by the French army, have a most formidable set of buffers and bars set out a couple of feet in front of the radiator. It consists of a very heavy steel gate, the full height of the radiator, with powerful coil springs back of it. In order to crank, or indeed to get near the radiator, the gate has to be opened; it is on hinges for this purpose. The officers here maintain that they need all this protection. The type of guard on the level of the frame members, as fitted to Packards and a few others, is generally useless, for the regulation army body has a rear overhang which will pass above the guard into the center of the radiator.

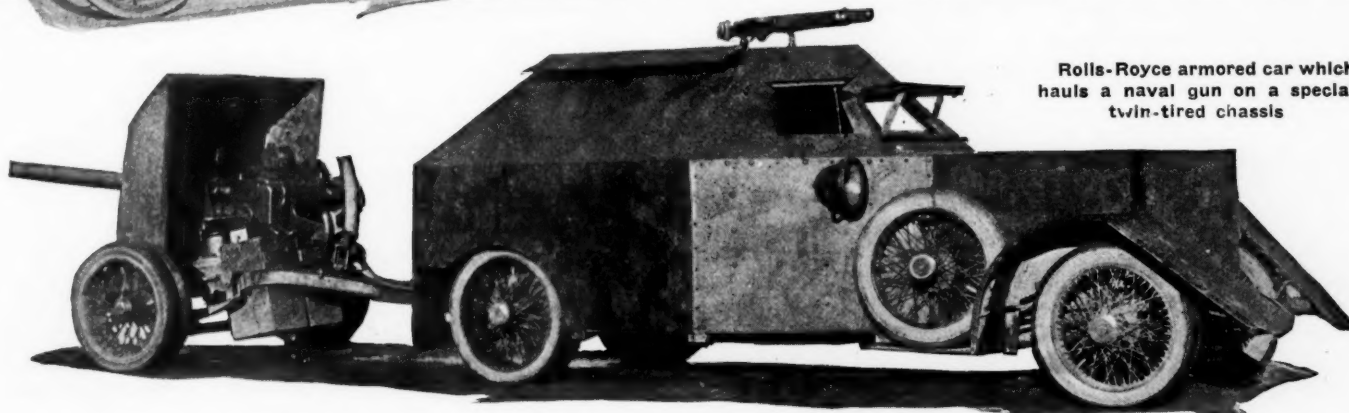
Some time ago White trucks were fitted with a stout steel bar carried in hangers rivetted to and projecting from the front of the frame members. The bar was ahead of everything and a few inches above the bottom of the radiator. This was not found to be sufficiently effective and now the bumper is an I-section steel member, as heavy as the frame members, placed level with the middle of the radiator. At the rear of the truck is a lighter transverse bumper, with coil springs back of it, placed at exactly the same height as the front bumper. In case of collision the two bumpers come together. It should be pointed out that these safeguards are not necessary for ordinary commercial service; they were not even found necessary in the army tests prior to the war, for then skilled drivers were always employed.

Generally solid tires on trucks working in the North of France do not average more than 5000 miles. This figure is obtained from records of trucks using tires of a size considered adequate in civilian service. The shorter life is due to the more strenuous conditions under which the trucks have to operate. No matter how good the service, there is always a certain amount of speeding; English drivers are as great sinners in this respect as the French. In the northern parts of France most of the roads are granite paved, with a macadam or dirt strip at each side. When traffic is heavy the right-hand wheels are constantly slipping from the paved portion to the dirt strip, and back again, this series of jumps causing the tires to chip away laterally. Sections of the tire also loosen from the

London omnibus B type chassis carrying a naval gun



Rolls-Royce armored car which hauls a naval gun on a special twin-tired chassis



rim, and when there has been a loosening up in two or three places the whole tire is liable to come away. This appears to be due to bouncing of the wheel on the road; when driving fast the wheel strikes the ground at intervals with considerable force, and these repeated blows loosen the rubber from the base. It is found that this is more common with front than with rear wheels.

Another source of tire trouble, which was known to users before the war, but has become more accentuated since, is due to arched roads. It is obvious that with a truck running on one side of a highly crowned road the full width of the tread cannot be in contact with the road surface, and the wider the tire the smaller the proportion in contact. This throws an excessive load on one portion of the tire, or on the inner tire when duals are used, and causes rapid wear. The evil is lessened on those trucks having chain drive with slightly toed-in wheels, as is common with the front wheels of automobiles.

This evil has been recognized for a long time and attempts have been made to construct a type of transmission allowing the wheels to accommodate themselves to the arch of the road. Also the latest road engineering practice is to make road surfaces as flat as possible consistent with drainage. The war has only served to emphasize the need for attention to this matter. Where worm, bevel, internal drive, and chain drive trucks are working together it has been possible to make interesting comparisons on this question of tire wear.

War's Severe Test

The war is proving more strenuous than the severe tests to which some of the manufacturers submit their trucks at home. As an instance, a high-grade American worm-drive truck is giving trouble owing to the breakage of differential housings. This is a good truck, which before being put on the market was given a very thorough try-out in the Middle West and the West, without any defects being revealed. However, the roughly paved roads of Northern France, together doubtless with some overloading and some speeding, are causing the housings to crack, and the maker is replacing them free of cost. Closely examined, this is found to be a case of faulty design, but is a fault which American dirt roads and cross-country conditions could not reveal and which required the abuse of war service to bring it out.

Many Parts Fail

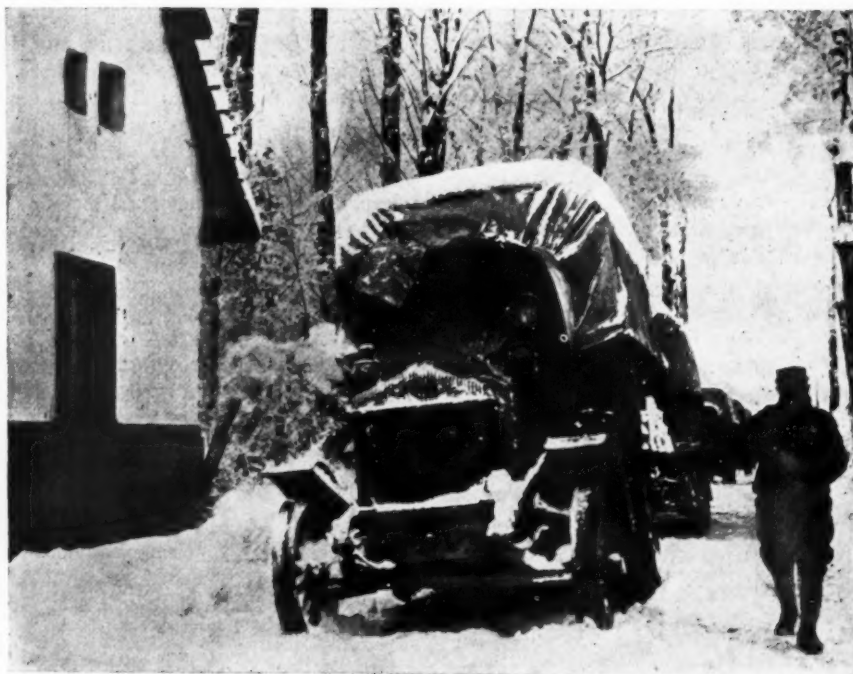
There have been some other cases of axle housings failing, but these have been traced to a heavy load shifting to the right-hand side of the truck. Loads of shells are particularly liable to slip in this way, and as the right-hand side gets much more pounding than the left, it is not surprising that axles sometimes fail.

Manufacturers all over the world who had old models or units in stock have been tempted to get rid of them in the

various armies. These cases are now coming to light. One high-class firm used a certain number of touring car crankcases in order to finish a series. These were too weak for truck service, with the result that all the front hangers snapped and the French repair shops have had to fit these trucks with a steel member forming a brace under the front end of the crankcase. The policy of this company cannot be considered a wise one. Had it been a French company of equal standing, there would have been plenty of people to excuse or explain away the incident, as some French firms have so many interested boosters that the knockers are never heard. But being an American firm the bare statement goes round that X— crankcase hangers break off. There is nobody to explain, and X—, who makes one of the best trucks in America, is apt to be rated with the firm making one of the worst.

All American manufacturers are at a disadvantage owing to the absence of really skilled men, or men with lengthy experience of their particular make. At home real service is given users, and every manufacturer is interested in seeing that the user of his truck is getting the best out of them. In

the war zone there can be no real service, and even if the service man were on the spot he would not be allowed to follow up his own trucks. One case with which I am acquainted is interesting. Pierce-Arrow has about thirty 5-ton trucks in armored car service in Northern France. This is the most strenuous service on the front, for half the cars are overloaded all the time, and all of them have to operate very close to the German trenches. This fleet is in charge of an officer who knows all there is to be known about Pierce trucks



Pierce-Arrow trucks working under winter conditions

and who gives them all the attention that could be obtained from a service man at home. The result is that at the end of six months' active service in France, preceded by several months' service in England, not a single order has been sent in to the permanent store department. The only consumable stores that have been used are brake liners, lock washers, carburetor floats and needles, rear lamps, etc. Two men, one of whom is only a driver, are sufficient to attend to all the repair work.

In the same battery ten mechanics are required to keep the officers' touring cars and the despatch riders' motor-bicycles in proper order. In other sections of the army, operating in the same district, constant reports are being received of burned out bearings on Pierce trucks. Inquiry has shown that in every case this is due to the use of unsuitable, though not poor quality, lubricating oil for this type of motor.

Carburetor Adjustments Needed

Carburetor settings found right in America are very rarely satisfactory here, owing to the different grade of gasoline used and changed climatic conditions. If the trucks pass



A row of White trucks with a type of radiator guard that was insufficiently strong

through the hands of a tester in Europe, this trouble is considerably diminished; yet there are hundreds of American trucks operating extravagantly in Europe owing to lack of carbureter adjustment. As a general rule American trucks have bigger motors and will do a lot more top gear work than those of European construction, but much of this advantage is lost owing to indifferent carbureter settings.

Magnetos Last Six Months

One important repair depot finds that magnetos cannot be relied on for more than six months' average under war conditions. At the end of that time they have lost much of their magnetism and various screws have begun to work loose. The repair depot in question finds it necessary to remove and carefully examine all truck magnetos every six months. The same trouble has been observed at various times on visits to touring car repair depots, but this case of the trucks is the only one on which really reliable data has been obtainable.

Carbureter Needles Wear

There is an unusual wear of carbureter needles attributed to the presence of very fine sand in the gasoline.

The complaint is heard that differential locks are not sufficiently used; under present conditions they are more than a luxury.

Self-starters are not appreciated. They are to be found on one make of truck used by the French, but they are very rarely in a condition to be used. More often than not the batteries are requisitioned to light a dug-out, or some under officer takes them to light his own quarters. Some of the mechanical transport sections use enormous quantities of dry batteries, but the current is used for lighting the men's quarters and dug outs and not for exploding charges in the motor cylinders.

Want Simpler Control

As army regulations call for two drivers on each truck, a self-starter is certainly a luxury. Controls should be simplified for military service. With two ignitions, spark and throttle levers, extra air lever, electric light, electric self-starter, and gasoline and lubricating oil gages, there is enough to keep the average green driver worried for at least twelve months. At least one truck has the whole of this equipment. The ideal is fixed ignition, with magneto only, and accelerator pedal. A lever on the dash should regulate minimum throttle opening and cut off the ignition when fully closed. The use of a motor governor is preferable; European manufacturers had little use for the governor before the war, but they have changed their views since.



Disembarcking at Salonika

"The man who is driving an ammunition truck at the front has got the least satisfactory job in the whole army," declares an automobile agent who has been serving as a private in the infantry since the beginning of the war, and was present at the great Champagne battle last September.

Trucks Run to Firing Line

"There is an impression that automobile driving is the soft job of the war, but as a practical motorist I would much rather be serving in the trenches than at the wheel of a truck. The number of shells which had to be fired by each gun prior to the infantry attack in Champagne was really prodigious. Thousands of American trucks were running day and night, taking shells right up to the gun positions, for the old method of transferring to horse teams has long been abandoned. Generally the guns are in positions away from the main roads, but special tracks are made so that the automobile trucks can go right up to them. The ammunition is unloaded and placed in underground shelters within easy reach of the battery. Naturally the enemy keeps a close watch for the ammunition columns and shells them whenever possible. If an enemy's shell strikes an ammunition truck there is not much left of either truck or men. In the big attack a certain number of American trucks were blown up in this way.

Truck Drivers Hard Worked

"When a big offensive is in progress truck drivers are much harder worked than men in any other branch of the army. I met some drivers who for three weeks had not averaged more than four hours sleep out of each twenty-four. The call for ammunition was so great that they had to work prac-



Steam tractors are still used extensively

tically day and night. When off duty they slept in hammocks fitted up inside their trucks. Some of the men have displayed considerable ingenuity in making their trucks into comfortable living quarters. They strengthen the top, so as to make it absolutely waterproof and capable of supporting two hammocks, and they make the front and end panels of the body close fitting, so as to keep out all drafts. Hay in the hammocks is an additional comfort. The beds have to be arranged so that they can be put out of the way almost instantly and brought out as quickly. In rush times the men get their sleep in snatches, and it is a great convenience to be able to pull down the hammock, get into it and sleep by the roadside for an hour.

Straw Packed Radiators

"The men take the same care to keep their motors warm as to preserve themselves from the cold. Precautions have to be taken as a matter of safety as well as general convenience, for delay in getting away may be fatal. The most commonly adopted plan is to make two straw mats, such as are used by gardeners, one fitting closely round the motor hood and the other completely covering the radiator. An additional precaution is to drain the carbureter float chamber and leave a small kerosene lamp burning under the hood. In this way a truck can stay on the road all night and be easy to start in the morning. Water is not usually drained off, for there may be difficulty in getting a fresh supply, and anti-freezing solutions are not much in favor with the drivers.

"Not only have truck drivers little opportunity for sleep, but they cannot count on meals with the same regularity as the infantry. During the Champagne attack drivers would often come into our quarters and beg food which they would take away with them to eat on the road. The men who are wise to the game make a point of always carrying reserve rations and a portable cooking stove. As there are two men on each truck at the front, one of them can look after the cooking arrangements while on the road or whenever a stop is made, and thus overcome the defects which are inevitable when men are moving

about frequently and rapidly as required in this military work with its rapidly changing conditions.

General Gallieni, the new War Minister, is on a campaign against all favoritism and abuse of privileges. His activity has been drawn toward the automobile section of the army and very drastic measures have been taken in one particular case. An officer in the territorial army had taken as his orderly a soldier who was the private owner of an automobile, the officer and soldier making use of the car for their military duties. While there is nothing in the regulations specifically against this, the Minister of War considers it an abuse of the spirit of the law, for the fact that he owned a car gave the private soldier an advantage over his companions and the officer got the use of a non-military machine.

Punished for Using Own Car

As a punishment the officer has been condemned to sixty days imprisonment in a fortress and to the loss of his rank. If he is of military age he will still be eligible to serve as a private. The owner of the car has been ordered to take his place in the reserve depot and to be sent to the front with the first draft. This decision has been sent to all military commanders as an example.

In automobile circles there is some annoyance at the tendency of military authorities to look upon professional drivers and mechanics as shirkers. The purely military view is that any old man can be taught to handle a truck or a touring car and that the best place for young professional drivers is in the trenches. Thus men totally devoid of mechanical ability are being rough-hewn into drivers and men of twenty years road and factory experience are sitting behind a gun. One specific instance is that of Louis Wagner, twice Vanderbilt Cup winner, who until recently was serving as a private, while the truck driver attached to his regiment was a former village schoolmaster with one week's experience at the wheel. There is also a tendency for the professional military view regarding automobilists to be shared by the general public, with the result that automobile drivers are considered to be in less danger than men serving in other branches of the army. Because of this a large number of professional race drivers have asked for and obtained transfers to the flying corps. The men consider that they are in no more danger in the air than on the road, but they get credit for undertaking more difficult work.

Want Motorists to Drive

As a protest against the present system, a syndicate of automobile drivers and an association of automobile manufacturers at Lyons has written to the Minister of War and other public officials asking that all professional drivers and mechanics should be drafted at once into the army automobile service. The next set to be called up for automobile service should be those men who had once been professional drivers; following this drafts should be taken from private motorists holding the Government driving license, the men with the oldest licenses being called first.

The adoption of this plan would improve the automobile service of the French army and, besides this, would result in a marked economy in the operation of the military automobiles and motor trucks.



The latest form of French Army Packard. Note substantial radiator guard

The Truth About Materials

All Metals Are Raised in Price, But Steel Supply Is Adequate—Rise Must Fall Partly on Consumer—Light Weight Design Encouraged—No Need for Alarm

IN a year the amount of steel that is being produced in America has doubled, and of this double output munitions of war consume but a moderate percentage. The doubled output is hardly enough to meet the demands of war and the immense demands of peaceful industry as well. Steel prices always have fluctuated with the normal alterations always taking place in demand and to-day, the demand being higher than ever before, the prices are likewise. But there is no *shortage*, there is no fear that any responsible manufacturer using steel in his business will have to curtail his output below what it was for last year, and there is little doubt that the automobile industry will be able to *increase* output to a marked degree.

In a broad and general way the attitude of the steel makers is that a regular customer can have his regular supply, the steel trade will stand back of the steel consumer whom he knows and trusts, but no consumer will be allowed to buy in excess of his real needs.

In two metals there is a real shortage, and means must be devised for doing with less of them in almost every class of service, these being aluminum and zinc, but slight changes in design render it possible to dispense with some aluminum and almost all brass, so the output of automobiles is not going to be held up on that account. Steel prices are unlikely to drop for some time to come, but the situation is easing in certain ways. For instance, there has been an immense amount of building done in 1915 and this is still in progress, but there are indications that the enlarging factories will soon have completed their growth for a time. Similarly, the railroads have needed much extra material in their attempts to combat the shortage of freight cars, and this will slack as the shipping situation eases, and it is beginning to ease perceptibly.

Cars May Cost More Temporarily

However, it is practically a certainty that all car manufacturers will have to raise the price of their machines for next year, or, if they do not do this and hold the prices where they are they will have to cut the quality. This is the unanimous opinion of men who are closest to the present condition of the materials market. In fact, there is no more important thing in the minds of automobile producers to-day than this question of price. There is no need for maintenance of present automobile prices, just as there was no need for the immense cuts made last summer. The demand for passenger cars and trucks is such that a rise in price sufficient to cover the rise in the cost of materials would hardly lose the industry a single order. To have the situation covered and more than covered it would not be necessary to raise prices of cars all the way back to what they were a year ago.

Three of the foremost companies have now raised the selling figure, Cadillac and Packard having done so some months ago, and Chalmers falling in line recently. Other concerns need have no fear in following this lead.

The general feeling is that all must meet the situation fairly and acknowledge that they cannot continue at present figures when it is costing them about one-fifth more to build the vehicles than it did a year ago, solely because they

have to pay much more for the raw materials. Therefore, it can be stated positively that, unless some unforeseen and highly improbable easing-off of the demand for iron and steel, copper, zinc, aluminum, brass, bronze, tin, etc., takes place, the profit in the vehicles will not be sufficient to give a reasonable return on the money invested.

Supply and Demand

The whole situation is primarily a question of supply and demand. There is an over-demand for everything and this is immediately reflected in the price. Fortunate indeed is the far-sighted purchasing agent who looked ahead and contracted for his supplies well in advance, but there are a great number who did not anticipate the present condition and it is these that are in difficulties. Steel mills will not contract now for material for delivery before six months hence, and there are mills which are asking ten months. Heretofore it has been possible to secure contract material within thirty to sixty days at the longest. This will immediately make clear the predicament of the concern which is not well supplied with what it will need for another half year. Add this question of delivery to the problem of price, and you make a combination which is serious for the big manufacturer as well as the little fellow.

Assemblers Suffer Most

Investigation has shown that only in very few cases have the manufacturers been able to take care of their prospective needs beyond January, 1917. They cannot even make contracts at present prices to extend farther ahead than that time because the steel mills will not entertain them. This may change as the year advances, but at present no one will venture to say what conditions will be when another twelve months roll around.

Apparently the car assembler is hit the hardest—much more than the producer who makes the parts he puts into his chassis. The parts maker only gets materials as he contracts for his product, and hence he cannot buy material in large quantity very far ahead unless he is a very big parts maker and is able to figure on a general average from year to year. This condition immediately reflects on the price which the car builder has to pay, and any manufacturer to-day will say that he is paying more in proportion for everything he does not make in his own shops. This means simply that the assembler cannot make as much profit to-day on a car which he sells at the same, or even a slightly higher price, than the actual car manufacturer, even though both cars were identical in quality and design. This statement would be discounted somewhat where the assembler works on a very large scale and is in a position to contract for what he is reasonably sure he will need many months hence, but very few are in that enviable position.

Some of the strong car makers will not feel the present great increases in price before next January because their contracts were made at lower figures to run until that time, but after that date none will say what he will have to pay. Therefore, with the announcement of 1917 models, which

will begin about the middle of the year if past policies are taken as a criterion, we will see increases all along the line unless some other way is found to surmount the situation.

Perhaps in some cases reduction of manufacturing cost can be made to offset the added cost of what goes into the cars, but this is very doubtful in view of the enormous increases. Then, too, the manufacturers, even though some of them are fixed until next January, will have to look ahead farther than that, because in most cases, they are simply getting nicely started on the new models by the first of the year.

Cost Up 20 Per Cent

For regular customers, the general advances in materials means at the present time an increased cost of about 20 per cent on every car turned out, all other manufacturing cost factors remaining the same. This takes into account all materials with which the automobile is concerned. It figures in the aluminum, copper tubing, wiring, etc.

To give a few specific instances of what this materials shortage—it can be called that—means, it might be said that the hot-rolled steel makers have increased prices nearly 100 per cent within a year. This takes in all sorts of bar stock which is a very important part of the car man's needs. Normally such material can be bought for \$1.10 per 100 lb., but at present it is quoted at \$2.00 and delivery is far in the future.

Manufactured steel is especially telling upon the automobile industry. This is the stock that is re-rolled and made into frames, and countless other parts. Small strips of this kind have advanced from \$2.40 per hundred to \$3.50 and \$4, and frame strips have gone up almost \$1 a hundred.

One prominent manufacturer with an output of some 15,000 cars yearly figures that the frame alone costs \$4 more than it did last year, and this advance is proportionate throughout. Nor does the advance stop with the metals; on the contrary the leather and upholstery materials are up, too.

Effect on Parts Makers

What has been said regarding car makers applies with equal force to the manufacturers of component parts for cars. Needless to say, they cannot take contracts with a certainty of delivery at any specified time, nor will they take any new business without raising the price to meet the new conditions, and perhaps even discount further advances to a large extent.

The parts people are especially hard hit in cases where they have long time contracts to meet which were taken at prices based upon material costs far below present prices. Unless they were able to contract for what materials they needed, at prices in proportion to what they are getting for their products, they are simply taking the loss out of their expected profit. In many instances the parts concerns under contract have been to the manufacturers with the matter, but the car maker's answer is that he is in the same boat, and naturally looks to the parts man for that which he has planned.

This condition was well illustrated by a well-known carbureter maker of Detroit. He buys \$12,000 worth of brass castings monthly and the cost has risen from 20 to 27 cents a pound, with an expected advance to 35 cents. He further uses \$2,000 worth of brass rod each month, and on that the price has gone from 13 cents normally to 35 cents. Besides this, deliveries cannot be secured within four to five months, whereas in the past he has been accustomed to get what he wanted within two to three weeks.

Weight-Saving Design Forced on Engineers

As a result, this carbureter producer is like all others—he is trying to reduce the weight of his instrument by re-designing and shaving here and there without impairing the design. Necessity is dictating great things in the carbureter field, as in most others, for in another great car-

bureter plant in Detroit they are daily turning out 500 carbureters made of malleable iron instead of brass because the former is a cheaper material and seems to work equally as well. Some of the makers are even striving so to build their carbureters that some parts can be made of pressed steel, this reducing the cost.

So it goes down through the industry. You will see axle makers scratching their heads over problems of weight reduction; see them substituting certain constructions for others where they can save in material cost without hurting quality; you will see this thought uppermost in the minds of a great many engineers.

Position of the Automobile Industry

It is sometimes suggested that the industry should assert itself with the iron and steel makers, the aluminum producers and the rest. The assumption being that the industry takes such a large proportion of these products, that it should be able to demand deliveries when it wants them; in a word, it should by its united strength be able to bring the materials people down on their knees and bring about reasonable service.

Nothing could be more absurd. *The combined tonnage of iron and steel used by the automobile industry is not over 5 per cent of the total production of the iron and steel industry of this country.* Why should the iron and steel industry, then, have any particular regard for the automobile industry? The railroads, the structural steel users and the bridge builders are the big consumers, and their demands must come ahead of the automobile makers. This fact is recognized by a great many of the automobile men, but it is likewise overlooked by a great many.

The total consumption of steel last year by the automobile industry was not over 1,200,000 tons, whereas the production estimated for 1915 was about 24,000,000 tons. One has but to figure it out to see where the automobile industry must inevitably stand in the eyes of the greatest of American industries—iron and steel. By careful estimate, it was found that one car maker with an output ranking very close to the top, utilized about 10,000 tons per year. Supposing there were 150 companies producing cars who used an equal amount. The total would be 1,500,000 tons, but as there is not anything like that number, the figure will be roughly correct, nevertheless, when we equalize it by considering that Ford, Overland, Buick, Studebaker, etc. make more cars than the firm from which the estimate of 10,000 tons was obtained. Even then we are probably high in the total consumption, but if we are high, the percentage that goes to the automobile industry must be even less than 5 per cent. And 5 per cent is low enough.

To-day it is said that certain of the munitions makers are offering a premium of 2½ cents and more, per pound, for preferred rollings, this over the present market. Think of that point along with the meager percentage of five, and you will wonder why the automobile industry is treated as well as it is at present.

Some Effects of Conditions

An important result of present material conditions and the future outlook is that designers are paying closer attention to weight reduction and better working out of the details of their cars so that every pound of useless weight can be eliminated. Each pound is important.

There is also chance for capitalization upon the situation. Supposing a maker has bought farsightedly and advantageously. He can raise prices with the present market conditions as an excuse, and thus increase revenue with no added production cost, for the length of his contracts at least. This, it would seem, he has a perfect right to do, and it is a reward for his buying shrewdness.

One thing seems certain. The makers should tell the public plainly how things stand and frankly meet the issue.

Minneapolis Center of Huge and Growing Prosperity

Twin City Show Is Annual Meeting Place for All the Great Northwest—Show Serves 4,000,000 Population

By David Beecroft

MINNEAPOLIS, Feb. 7.—The Minneapolis show, drawing its thousands of dealers and tens of thousands of citizens from the great Northwest territory embracing all of the State of Minnesota, all of North Dakota, all of South Dakota and the eastern half of Montana, to which might be added the northern counties in Wisconsin, is perhaps the most potential show west of Chicago. It is a greater gathering point for dealers than Kansas City, Omaha, or Des Moines, and is a veritable magnet for the public throughout the territory, a public which does all of its buying in the Twin Cities and looks to them as New England looks to Boston, as the South looks to New Orleans and as the Rocky Mountain section looks to Denver and Salt Lake City.

Naturally, then, the week's motor car show, with its sixty-four different makes of gasoline cars, its four makes of electrics, its six different makes of motor trucks and its two makes of tractors for the farm, not to mention a small outside tractor show, gives the 4,000,000 from these States the best opportunity to view the show, to shop in the Twin Cities and to meet their friends. Show week is the great gathering together event of the year for the Northwest. Hotels are crowded by reservations booked weeks in advance, theaters play to sold-out houses, lodging houses are at a premium, and the great Northwest measures its strength, takes inventory of itself in show week as it does in no other week of the year.

It is meet that this greatest of all distributing territories for automobiles should have an annual week that measures up with any other city outside New York and Chicago, with the possible exception of Boston, which has more cars on exhibition at its annual show.

These are the greatest years that the Northwest has ever known, and the more conservative bankers of the Twin Cities show you figures which go a long way to establish the fact that it is questionable if there is any other territory on the earth's surface, in this or any other country, where prosperity of all classes has reached so high a mark as in our own Northwest during the past eighteen months.

Prosperity Is Prodigious

The prosperity of the farming communities is staggering. Crops in 1914 were record breakers and sold at high-mark war prices, but 1915 crops were often 50 per cent higher and, while prices have been a little lower, the sum total of crop value for 1915 is vastly in excess of 1914. These two have been years without precedent. The agricultural sections of Minnesota, the Dakotas and Montana have fallen into unexpected wealth, just like the Eastern stock speculator who got in on General Motors or Bethlehem Steel when they sold under a dollar and watched them steadily climb to 500 or higher.

Some farmers who bought "quarter sections," or 160-acre farms five years ago and who for two or three seasons were

not able to pay interest or even taxes have within the last two months not only paid off all taxes and interest charges, but entirely paid for the land. This means that all other bills have been paid, and that the proud possessor has a snug bank account.

The condition of a great territory is always reflected in the financial reports of the territory, and the Twin City banks are always a sure criterion of the financial condition of the Northwest. E. W. Decker, president of the Minneapolis Loan & Trust Co., whose estimate of money conditions in the territory stands highest, says there never was a period when the Northwest was in such good financial condition. Scores of the small country banks are carrying deposits of \$500,000 with the large Twin City banks, an undreamed of condition. In the four States money is more plentiful than ever before. The interest rate on mortgages in parts of Minnesota has dropped from 6 to 5.5 per cent, and to as low as 5 per cent in a few sections. There has been a more general paying up of old debts of four or five years' standing than ever before; in fact back debts are no more.

When in Rome do as the Romans do, and when in Minneapolis you must think as the Twin City people. Here you think crops, the production of the soil. Money and crops are synonymous. If you sell automobiles, you must think crops, because farmers own over one-half of the 95,000 automobiles in the State of Minnesota. Statistics do not give the farmer percentage in the Dakotas and Montana, but it is equally high if not higher.

Registration 35 Per Cent Up

Perhaps before analyzing what crops were last year, and what they are expected to be this year, we can get a better realization of their value by glimpsing what crops have already done in increasing the number of automobiles in the State of Minnesota. To-day Secretary of State Julius A. Schmall states there are 95,000 cars in the State, while a year ago there were but 68,500 machines. The increase in the past year has been 24,500, an increase of 35 per cent during the year. The secretary estimates that 35,000 cars will be sold in 1916, and he is a good estimator. A year ago he predicted 100,000 cars in the State by Jan. 1, 1916. Unquestionably this total would have been reached had the dealers been able to get all the cars they could have sold. Hence the large Buick distributor claims he could have sold 2000 more cars if he could have obtained them.

Overland, which stands next to Ford in the territory, could have disposed of several thousands more. The same is true in proportion to output with many other concerns of smaller output. There is nobody familiar with the facts who does not believe Secretary Schmall's estimate of 100,000 would have been exceeded could the vehicles have been obtained.

Glance over the growth of motor car, automobile, registrations in Minnesota since 1909, when registration began.

These figures of growth tell best their own story. To them you can add 2000 registered chauffeurs and 474 registered automobile dealers.

1909.....	7,000	1913.....	45,800
1910.....	12,500	1914.....	68,500
1911.....	19,000	1915.....	95,000
1912.....	28,400	1916 (Estimate).....	130,000

Farming Community in 2.25 to 1 Proportion

Looking into the present 95,000 cars owned in the State a further analysis shows that the farming community is a very great buyer. The *Farmer*, in an analysis, shows that 36,000 cars are registered in towns of 1000 population or less. The majority, in fact, nearly all of these cars, go direct to farmers. The relative number of cars owned in small towns and the number in the three large cities of Minneapolis, St. Paul and Duluth, proves the farmer's case still further. These three cities have a combined population of 700,000. The total farm population of the State is 750,000. The total number of cars owned by the farmers is 46,000, whereas these three cities have but 20,000. The farmers are two and one-quarter times as strong in car ownership. In the towns of 1000 population or under the people are buying cars to-day at the rate of one car to every thirty-five people; it is estimated that by 1926 there will be one car for every ten people in the State of Minnesota.

But Minnesota farmers are not anywhere near the saturation point, so far as car buying is concerned. There are 156,000 farmers in the State. The average farm contains 177 acres. The average value of a farm in 1910 was \$9,500. Of these 156,000 farmers it is conservative to estimate that 100,000 can afford to buy cars within the next five years. To-day 46,000 of these farmers have cars and 54,000 are waiting to buy.

Perhaps a brief analysis of how certain makes of automobiles have increased in the State during the past year will serve as a better indication of what may be expected this year and next. Ford registrations have increased by 12,000 cars, 2500 of these going to the large cities and 5500 to towns of less than 1000. Overland has increased 2545, 311 going to the large cities, 1522 to the towns of less than 1000. Dodge has registered 948 during the first year of its sales; Maxwell has made an increase of 1291 in the year. Studebaker has increased 2636, Reo 518 and others in like proportions. Here are some of the makes that lead in registrations in the State:

Ford	30,708	Chalmers	826
Overland	7,518	Regal	787
Buick	6,686	Kissel	718
Studebaker	5,637	Packard	653
Maxwell	3,551	Saxon	664
Reo	2,380	Vellie	637
Cadillac	1,597	Paige	613
Chevrolet	1,284	Krit	563
Oakland	1,075	Imperial	542
Mitchell	983	Metz	516
Dodge	948	Oldsmobile	505
Hudson	917	Jackson	505
Hupmobile	893	Jeffery	440

These figures show that farmers must be buying cars selling over \$1,000, and a straw vote of the Minneapolis distributors exhibiting at the show was conclusive to demonstrate that farmers are gradually mounting in the price scale, and that many farmers own cars listing at more than \$1,000.

Minnesota License Lasts Three Years

Minnesota is typical of Middle Western States that do not pay too much for automobile registration. She has a tri-annual system, a registration fee of \$3 having been sufficient for three years, or a dollar-a-year rate. The present tri-annual registration dates from Jan. 1, 1915. Beginning with the next tri-annual period, Jan. 1, 1918, the registration fee has already been fixed at \$5 for the three years. Registration for the last two of the three years will be \$3.50. In Minnesota the license tags belong to the person registering and do not go with the car in case of sale.

During the past year the Twin Cities territory has ad-

vanced into a new position in the automobile field by becoming the biggest distributing territory in the country for several makers. Manufacturers are beginning to appreciate the importance of the territory. It is several years since Ford established its large assembly plant here, and preparations are being made practically to double its size.

A step which well indicates the importance of the Twin Cities and the buying capacity of the Northwest is the erection of the mammoth storage building put up last fall by the Willys-Overland Co. and only recently occupied. Here is a huge brick structure four stories high and capable of storing 7500 cars to be held for quick shipment to the hundreds of sub-distributors and dealers in the four or five States served. The new building is a model of its kind, and the only one of its particular type in the country. It is an impressive structure 462 ft. long and 280 ft. wide, occupying one of the most commanding positions on University Avenue, the connecting thoroughfare between Minneapolis and St. Paul. The building is just over the dividing line and stands on St. Paul territory. Although a four-story building, it is much higher from a car-storage viewpoint, as its storage floors are double-decked, the second deck on each floor being a suspended steel frame-work with the long lines of cars carried on two 4 by 6-in. angle pieces. The entire scheme is such that one man can easily push any car off the railroad car from the switch lying along one whole side of the plant to the elevator, and thence to any part of the storage space.

Across the front, on the ground floor, is a mammoth show room, and over it on the second floor are the offices. The basement has a large battery room, and is also used for tuning motors, while half is given over to car storage. On the main floor is a stock room 140 by 60 ft. for spare parts for the territory. Cars are at present being received at the rate of fifty per day, and there is a force of twenty-two men looking after the plant. The salesroom and offices have not yet been opened. The territory served includes Wisconsin, Minnesota, Iowa, Montana and the two Dakotas.

But there have been other automobile activities during the past year. Chevrolet is at present negotiating for a site on which to erect one of its assembly plants; and real estate people are arranging with the Maxwell company for larger arrangements for representation in the Northwest.

Tractor Business Growing Fast

Another motor aspect that has developed in Minneapolis and St. Paul during the past year is the agricultural tractor business. The Twin Cities are to-day the acknowledged home of the agricultural tractor industry, just as Detroit claims similar distinction in the motor car trade, Pittsburgh in the steel industry, Chicago in live stock and New York as the financial center. To-day there are over twenty-five concerns building agricultural tractors, and every week brings a new one to the surface. Nearly every back-yard machine shop has a tractor in development, in fact tractor development is as rampant here to-day as automobile promotions were in Detroit four years ago.

The amazing crops of the last two years have largely been responsible for this development, although the tractor industry in the Twin Cities is over five years old, many having been built eight and nine years ago. The largest producer markets the Bull tractor and will build approximately 5000 next year, while the output of others will range from this figure down to ten machines. There were several makers that put out twenty last year, others that built forty, and others that went over the 1000-mark.

A rapid development of the tractor industry is looked for. The farmer is a heavy car buyer. He has learned the utilitarian value of the gasoline engine. It is not necessary to sell him the engine. It only requires time until he has enough ready cash to replace his horses with the gasoline engine.

The trend of agricultural tractor development will unquestionably follow closely the trend exhibited in passenger cars

and also in motor trucks. Already the low-priced machine has arrived in volume. The old price of \$3,500 has been cut until you can now buy machines for less than \$600. The bottom limit has not yet been reached, but it is certain that the \$500 tractor will be the big-column type. This fact is already realized by the tractor makers, and there is more activity in this field than in the low-priced automobile field.

Automobile Dealers Handle Tractors

A point of particular interest to automobile dealers is that tractor makers are turning more than ever before to the automobile dealer as the person to market the tractor. In the past the implement dealer has sold them, but the automobile dealer is accepted as having a better knowledge of the gasoline engine, as having better service facilities and being generally in a better condition to market the low-priced tractor than is the implement man. The automobile dealer sells more than one-half his cars to the farmer, and taking on the tractor line will be quite in harmony with the present movement in the development of his business.

Having noted the very general development of the automobile business in the Northwest during the past year, we must next look to the all-convincing question of crops to get a correct estimate on the buying capacity of Minnesota, the Dakotas and the eastern half of Montana, as well as the northern counties in Wisconsin, the territory served by the Minneapolis distributors.

Minneapolis and Duluth are the two great primary grain markets for this territory. The products of the farm reach these two cities and it is in them that Chicago, Liverpool and the other great grain-buying cities secure their supplies.

Some conception of what grain has been grown in this territory in 1915 can be had from the fact that between Sept. 1 and Jan. 1 there were 264,000,000 bushels of grain shipped from the farms and delivered in Minneapolis and Duluth. In Minneapolis alone, 160,000,000 arrived in these four months. That meant 40,000,000 bushels a month. It meant that every day during those four months a million and one-third bushels of grain were arriving in Minneapolis. It is a staggering total even to blasé grain merchants in this city. But this total does not in any way represent the total volume of grain, because the farmers are holding wheat and oats for higher prices.

Here are a few examples of how the 1915 crop has quite outdone the bumper crop of 1914. The Dec. 30 federal government report gives the value of wheat to the farmer for Minnesota alone at \$66,078,000 as compared with \$43,834,000 for 1914. Here is an increase in dollars of over \$22,000,000, this representing more than a 50-per cent increase in value over 1914.

Now turn to North Dakota: For 1915 the wheat value at the farm was \$132,214,000. In 1914 it was \$82,408,000. Here is an actual dollar gain of \$50,000,000; it is a gain of over 60 per cent in one year.

Turn now to South Dakota: The figures for wheat are \$54,835,000 for 1915 as compared with \$29,672,000 for 1914. Here the output was nearly doubled in a year.

Lastly, look at Montana and her wheat gain: The figures are \$26,384,000 for 1915 as compared with \$16,704,000 for 1914. Here is another gain of over 60 per cent in the year.

Wheat Gains \$107,000,000

Now recapitulate: Here is \$107,000,000 more for wheat alone in these four States than a year ago. These figures are not speculations, they are established facts. But this \$107,000,000 means more to-day to the automobile dealer than it would have meant a year ago. To-day the farmer's financial decks are cleared. Last year from his bumper crop he paid his back payments on land, paid back taxes, redeemed his old notes, paid his old implement bills and feathered his bank account. This year he starts without these handicaps of former years. Of this volume of wheat money, which

represents but a small percentage of crop value that the farmer has, a good percentage is going toward buying automobiles. No longer is the banker talking against the automobile. To-day he is the greatest booster for it. He now sees it as a utility, an investment. These same bankers to-day see the time when the agricultural tractor will be considered a sound financial investment to these same farmers. The tractor will enable them to work night and day with relays of men and thus get their crops in in good season. The same program can be followed in harvest time. The tractor will permit of deeper plowing and better cultivation of the soil; in fact, in divers ways the tractor will prove a great improvement over the present horse regime. At present the farmer's horses work 100 days in the year. They are idle 265 days. They must be fed these 265 days. Feeding them costs nearly as much when idle as when working. Herein is one of the great assets to the tractor argument. It is not piling up maintenance costs while idle.

But other crops are well in advance of the 1914 mark. The oat crop value on the farm is \$17,000,000 more for 1915 than 1914. The Northwest is the great center of the flaxseed industry of the country. Its value last year was \$24,000,000 as compared with \$19,000,000 for 1914. Over 99 per cent of this industry is in the Northwest, served by the Twin Cities and Duluth.

Summarizing a few of the crop figures, we discover that for 1915 the total of eight crops aggregates \$589,428,000, well over half a billion of dollars. The crops included in this total are wheat, oats, corn, barley, flax, hay, rye and potatoes.

The ratio that the Northwest bears to the entire country is obtained from the figures for the country on these same crops for 1915, where the grand total is \$4,662,926,000, as compared with \$3,235,319,000 for 1914. This represents a net gain of over \$425,000,000.

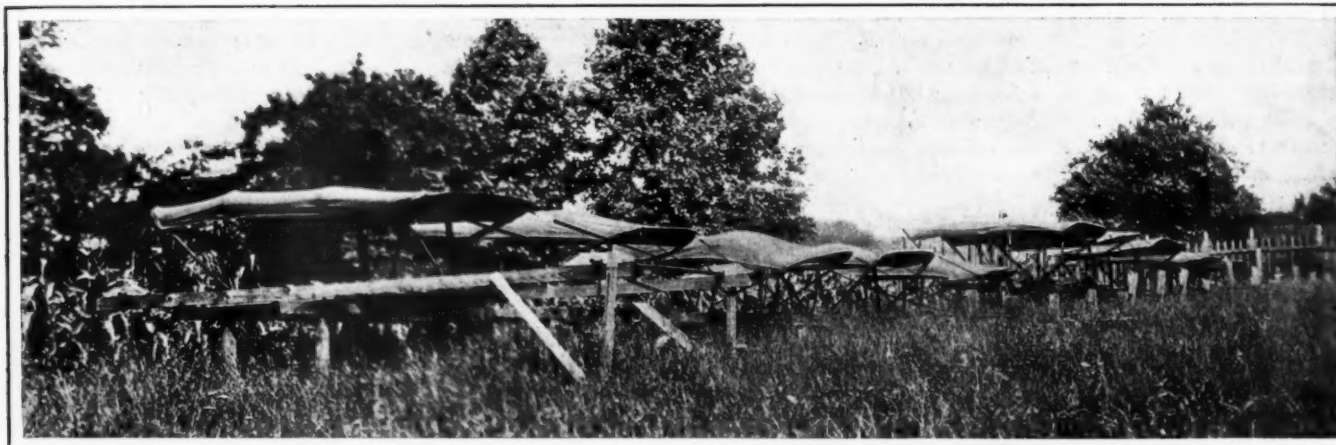
Physically the Northwest territory is as stupendous as the value of its products. It is a giant in dimensions. From Minneapolis to the limit of the territory in Montana is a 20 to 24-hr. ride on the limited trains. In area the States of Minnesota, North Dakota, South Dakota and one-half of Montana, to which is added a fringe along northern Wisconsin, exceeds the area of France or Germany. You could set six New England States in this area.

So great is this area—to be exact, 306,134 square miles—that you could put the whole 100,000,000 population of the country in it and there would only be 329 persons to each square mile. The population would not be nearly so dense as the present population of the State of Massachusetts, which has 418 persons to the square mile. It would scarcely equal New Jersey with 337 persons to the square mile. It would fall far short of Rhode Island with its 508 persons to the square mile.

Thus do we get some slight conception of this enormous Northwest with its empire dimensions and its city population of but 4,000,000. Its fertile fields can accommodate twenty-five times this number and then not suffer from congestion. Why should not our automobile makers with an eye looking to the future seize upon this great logical center for distribution and perhaps assembly? Are our tractor manufacturers to be criticized for selecting such a center for their industry which by 1955 will be a giant?

Use of Magnetic Materials

Circular No. 17 of the United States Bureau of Standards, on "Magnetic Testing," is published for the benefit of engineers and others who are interested in the testing and use of magnetic materials. It gives definitions of the fundamental magnetic quantities ordinarily employed in technical work, outlines the scope, and describes the methods of magnetic measurements employed at the Bureau of Standards, and discusses the type of data required in engineering work.



Tops of various manufacture tested by the Du Pont company for a year in an open field. They were opened and closed more frequently than if they had been mounted on cars in active service. Water was allowed to collect and stand on the tops for weeks and months at a time, as illustrated at the bottom of page 271

Solving the Upholstery Problem

Fabrikoid, a Du Pont Product, Developed To Supplant Split Leather on Popular-Priced Cars—Durability Demonstrated by Tests—Rayntite Is a Similar Material for Tops

IT has often been remarked that whenever the natural supply of an indispensable commodity decreases, or the demand for it increases, to a degree which threatens to embarrass the industries affected, the ingenuity of man rises to meet the emergency.

The uses to which leather is customarily put have increased enormously in recent years, and no more striking illustration of the multiplication of demand is being presented than the rapid growth of the quantities required for upholstering automobiles. Added to this and the widening of the other fields in which leather is largely used comes the great demand from abroad due to the European war. Then, too, the supply is not increasing in proportion to the heightened demand, while prices resultant upon these conditions make it very difficult, if not impossible, for the manufacturer of the popular-priced cars to use the best quality leather, usually referred to as No. 1 machine-buffed leather, which is conceded to be the best possible material for this purpose.

To meet the demand thus created the Du Pont Fabrikoid Co., Wilmington, Del., after two years' work, developed, about 1912, a grade of its product, Fabrikoid, suitable for upholstering automobiles. This material, the company claims, is superior in finish and durability to the so-called "splits," or sublayers of leather usually employed for automobile upholstery in default of the No. 1 machine-buffed grade, while it compares favorably in price with any of them. Moreover, the Du Pont company regards its type of upholstery material

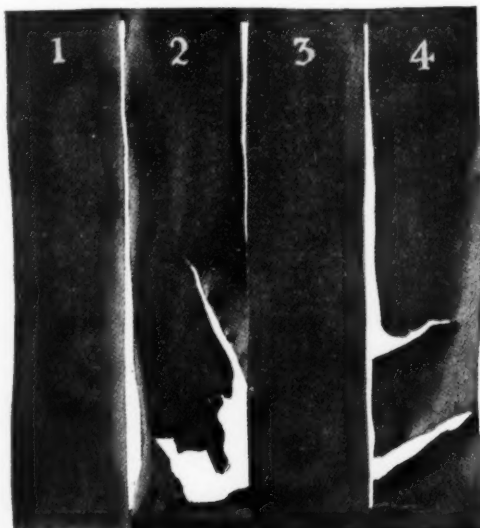
as the logical solution of the upholstery problem, the difficulty of which is enhanced by the low car prices due to keen competition. Another feature of the situation is the great increase in the demand for leather in manufacturing articles for which the Fabrikoid type of material is unsuitable.

Minimum Waste in Cutting

The Du Pont company estimates that 75 per cent of the cars on the American market for 1916 use upholstery of this type, of which 60 per cent will be Fabrikoid, stating that this is one of the improvements in efficiency and economy which made possible the low prices characterizing the majority, as compared with previous years. Over 70 per cent of the 1915 cars were fitted with this type of upholstery, of which 40 per cent was Fabrikoid, according to the same authority. A prominent factor in the economy attending its use is said to be the small percentage of waste in cutting, as compared with leather. Since Fabrikoid of the grade used for automobile upholstery is shipped from the factory on rollers carrying rolls of material 60 yd. long and 50 in. wide, the waste is minimized in handling, whereas the irregular shape of a hide renders it practically impossible to avoid a waste in cutting of 25 to 33 1/3 per cent.

Grain Is Embossed

Fabrikoid is made of moleskin, a very fine, closely-woven grade of cotton cloth, over which is spread under pressure, a coating of soluble cotton mixed with mineral coloring pigment and other ingredients imparting the



Results of an eight-hour test of the relative surface durability of Fabrikoid and split leather made on the machine illustrated at the top of page 271. No. 1 is black Fabrikoid and No. 4 is black split leather. No. 2 is Spanish-finish split leather and No. 3 is Fabrikoid in the same finish

qualities of pliability, toughness and elasticity. The first coats are very thin to insure anchoring the jelly to the cloth filaments. The resulting product goes to the embossing machine where it is given the desired grain by electroplates of real grain leather. The more popular grains are embossed by the use of rollers, this method facilitating quantity production, while the other varieties, which are made in smaller lots, are taken from plates being easily changed and less expensive than the rollers. Castor oil is one of the ingredients used in the jelly coating, the latter being practically the same as that used for coating the split leather used for upholstery work. The quality of the goods is determined by the number of ounces of coating solution applied per square inch, while the grade of cloth used depends on the tensile strength required. Prior to the development of the wide demand for materials of the Fabrikoid type, it was impossible to obtain the cloth used in their manufacture from American weavers, but more recently looms of the type required for its making have been constructed so that there is now no difficulty in securing it.

Strength and Thickness Uniform

Besides the qualities of pliability, toughness and elasticity mentioned, Fabrikoid is waterproof, easily washed with soap and water, not affected by extremes of temperature and oil or gasoline cannot stain it. Another advantage, as compared with split leather, is pointed out by its manufacturers to be its uniform strength and thickness throughout.

Tensile Strength 350 Lb. per Square Inch

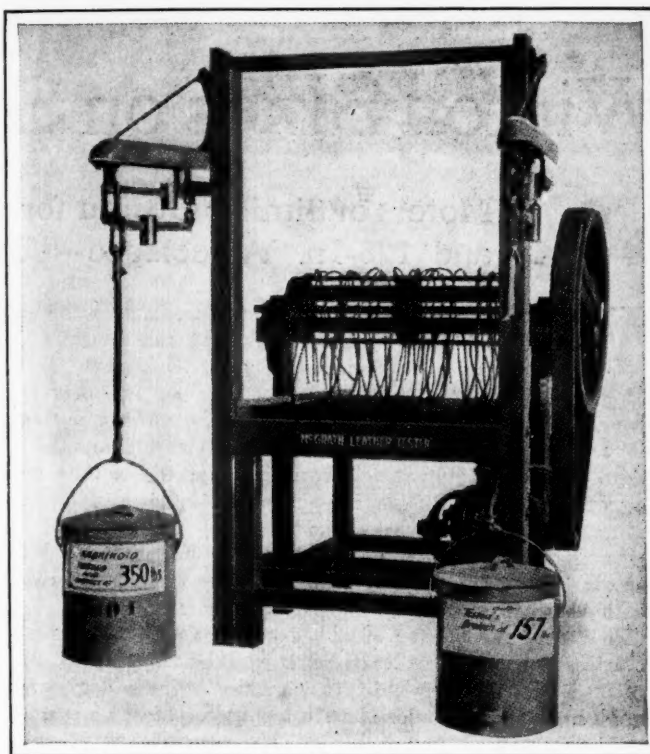
Motor Quality Fabrikoid, as the grade for automobile upholstery is called, is made in plain black grain, the Du Pont company stating that its tensile strength is indicated by the fact that it has withstood a tensile strength test of 350 to 400 lb. per square inch, whereas a piece of split leather broke at 157 lb. The method of making this test and its results are shown in the accompanying illustrations. A folded strip of Fabrikoid and a similar strip of split leather were secured to the two scale beams illustrated, and to the lower end of each was attached a pail of sand. The Fabrikoid remained intact at 350 lb. pull, while the split leather broke at 157 lb.

An Abrasion Test

Another test made on the same machine to determine the relative strength and durability of Fabrikoid and split leather consisted in a continuous whipping of parallel strips of these materials held by the horizontal frame as illustrated, the whipping means being beaters like sewing machine belting attached to the revolving rack driven by belt



During the year that the top materials were under test at the Du Pont plant the frames were frequently loosened and water allowed to collect and stand for weeks and months at a time to test their waterproof qualities



Machine for testing tensile strength and surface durability of leather, etc. A strip of Fabrikoid suspends the pail at the left, which contains 350 lbs. of sand. The strip of split leather suspending the pail at the right broke at 157 lb. pull. The beaters, attached to the rack revolved by belt from the electric motor, play on parallel horizontal strips of Fabrikoid and split leather. The results of this test are illustrated on page 270

from the electric motor. The ability of Fabrikoid to withstand severe surface abrasion was clearly demonstrated, the only effect after eight hours' whipping being a slight stretch, whereas the similar strip of split leather stretched badly and broke after three and a half hours.

The manufacturers state that Motor Quality Fabrikoid has been used for two years by several of the largest producers of automobiles in the country on several hundred thousand cars. During that period, they say, there has been only one complaint, a defective piece of goods being found on the driver's seat of a single car.

Rayntite—a Top Material

Closely associated with Fabrikoid is the material made by the Du Pont company for automobile tops. This is called Rayntite and it is manufactured in both single and double textures. Single-texture Rayntite is a Fabrikoid, and is waterproof, sharing the other properties of that material as well. The double-texture material is Fabrikoid combined with a cloth backing. Before Rayntite was put on the market it was tested for a year in competition with top materials of other manufacture, the tops being mounted side by side in an open field, as shown in the accompanying illustration, where they were exposed to all sorts of weather. They were also opened and shut frequently, in fact more than would be the case if they had been mounted on cars during the year of the test. The other illustration shows how the tops were left loose on the frames so that water might accumulate on them and test their waterproof qualities when subjected to this condition for weeks and months at a time.

The Du Pont company's business for 1915 was almost double that of 1914, due chiefly to the increase in sales of Fabrikoid and Rayntite materials to automobile manufacturers. A corresponding increase is expected for 1916, owing to the quality of the results shown on cars equipped with these materials and the increased output of popular-priced cars.

Winton Sixes on Standardized Chassis

Motors of Similar Design for Large and Small Chassis of 138 and 128-In. Wheelbase — Unit Power Plant Construction

WINTON policy for 1916 is summed up in two chassis with two six-cylinder motors and two lengths of wheelbase, as announced early in December, 1915. With the option of motor and wheelbase as the primary matter of choice, there are a number of secondary options such as the color scheme, wood or wire wheels and body design. Another interesting feature is that the chassis can be secured with two different types of bodies for winter and summer use and no mechanical changes are required in mounting the different bodies. All the wiring is brought to a single connection on the dash so that no electrical complications are met with in making the change.

The Winton models for 1916 are known as the 33 and 48, the prices for the stock cars being respectively \$2,285 and \$3,500. Both cars are built to give the highest degree of comfort and luxury combined with low upkeep cost. Mounted on wheelbases of 138 and 128 in. the cars are fitted with roomy seats, deep upholstery and the latest features of mechanical equipment. The design follows up-to-date practice with left drive, center control, unit power plant, underslung rear springs, vacuum feed, magneto ignition and

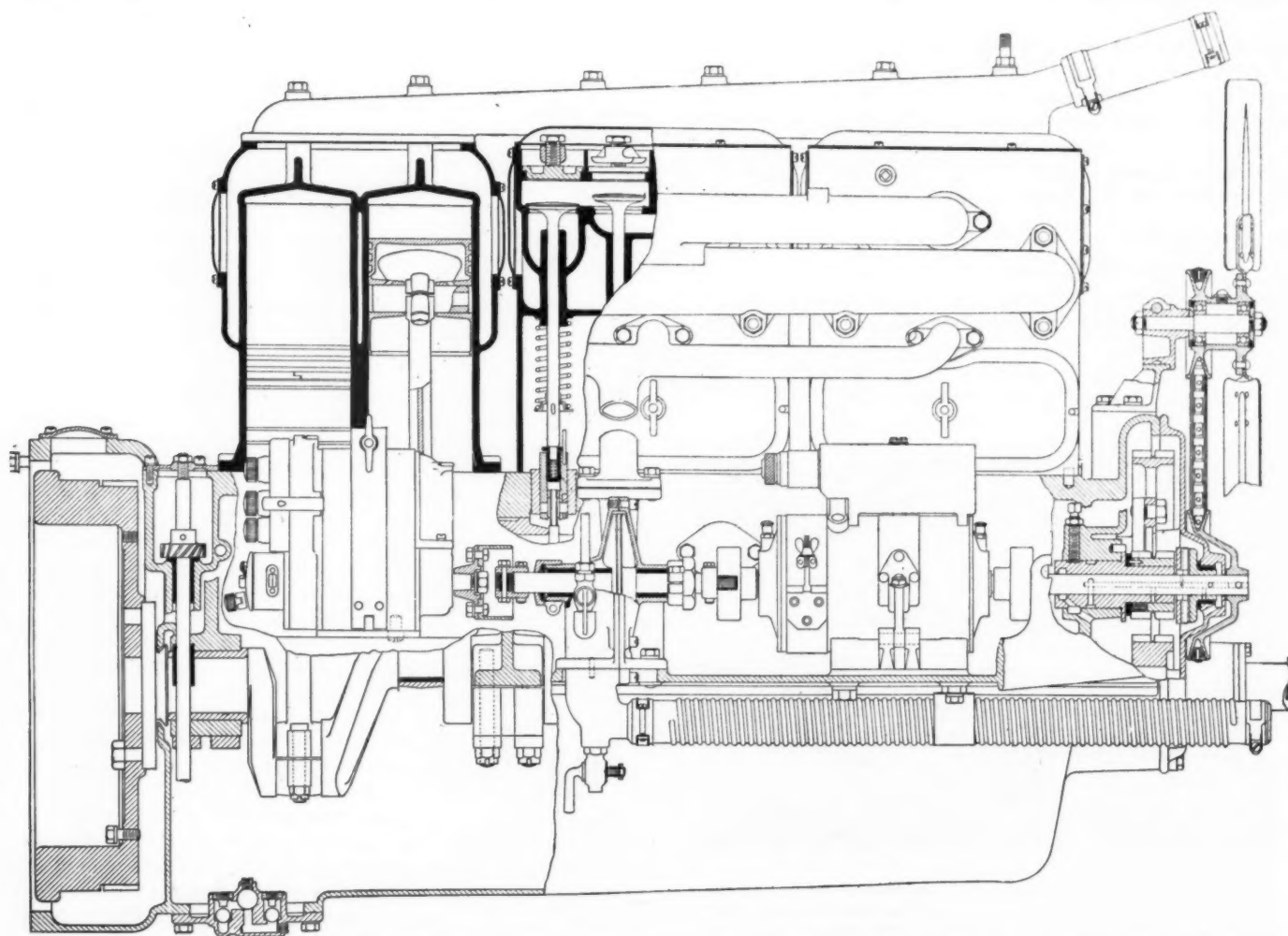
a motor-driven tire pump is incorporated within the stock jobs.

Both motors are similar in design, the 48 has its six cylinders cast in pairs and with dimensions of $4\frac{1}{2}$ by $5\frac{1}{2}$ in., has an S. A. E. rating of 48.6 hp. Following the tendency of the times all the moving parts of this motor are fully inclosed and all possible parts operate directly in an oil bath. The cylinders are cast of close-grain iron ground to a mirror finish and submitted before assembly to a hydraulic test of 300-lb. per square inch, the waterjacket space surrounding each individual cylinder.

The piston rings are concentric and in carrying out the balance scheme all the pistons, rings, connecting rods and wristpins must be of the same weight per set. Hardened tool steel is used in the piston pin, and as will be noted in the accompanying sections the connecting rods are long to reduce angularity of operation.

Chain Camshaft Drive

Following through the valve action it will be noted that the camshaft drive is by silent chain from the crankshaft. The camshaft and cams are a one-piece integral forging



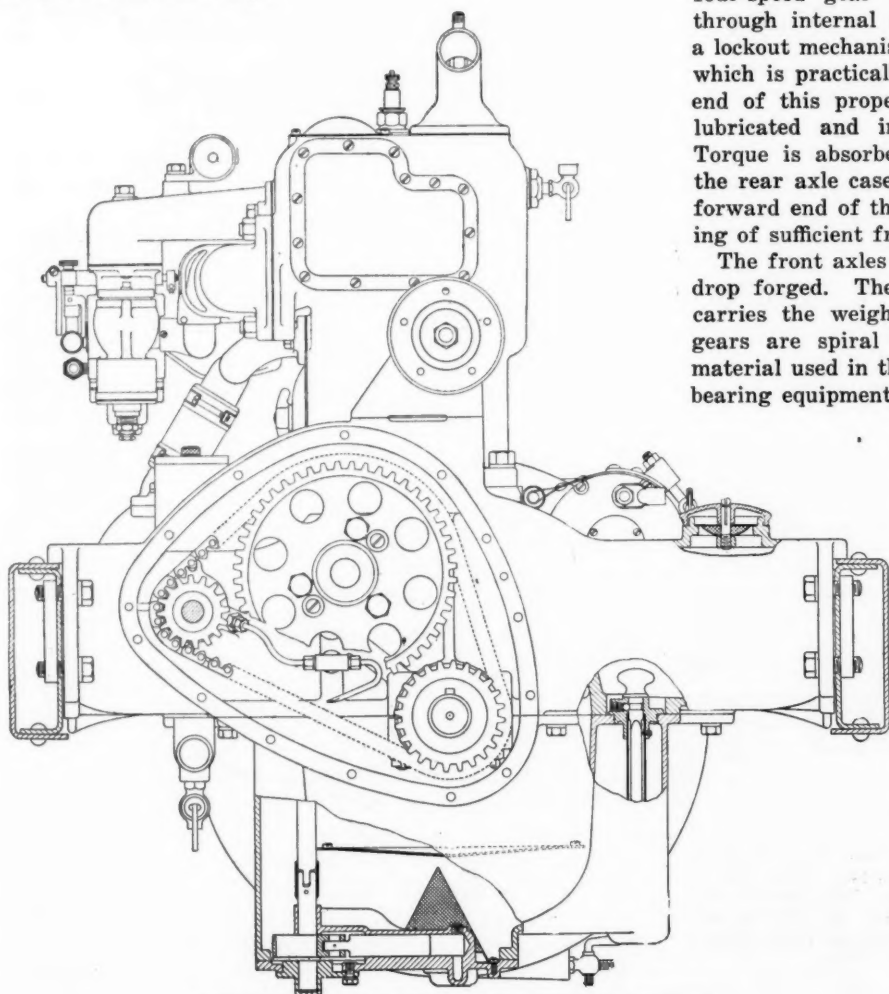
Partial section through Winton six-cylinder motor showing details of cylinders, pistons and valve action

with the profile of the cams such as to provide a gas flow proportional to the piston speed, and the entire shaft can be removed through the front of the timing case without removing the valves, valve springs, pushrods or rollers. To increase the durability of the chain the latter is equipped with a Moore eccentric takeup attachment. All the valves are the same size and the exhaust valves are of tungsten steel with nickel steel valve heads for the intake side. Covering the valve springs, plungers and adjustment points are steel plates.

Materials Chosen Carefully

Throughout the entire car the materials have been made the subject of a careful study. The crankshaft is chrome nickel steel having a tensile strength of 130,000 lb. per sq. in. and runs on four bearings bushed with Parsons' white brass, the crankshaft bearing surfaces being ground to a finish fit. For the crankcase, aluminum is used and the casting is provided with integral arms resting on the main frame. Also integral with the crankcase is the base pan extending from arm to arm, and the case itself is divided into two halves with the bearings all supported in bridges in the upper half. Fitted to the crankcase are a drain at the bottom for flushing and a breather pipe.

Electrically the car is equipped with the Bijur two-unit starting and lighting system and Bosch ignition system with storage battery to supply auxiliary current for starting. The magneto is strapped to the motor base and is connected to the water pump shaft by an adjustable metal coupling. A feature of the layout of the motor is the neatness of the wiring. It is all inclosed in insulating tubes and removable at the spark plugs without tools by means of quick-detachable clips.



Front view of motor with timing cover plate removed

Carburetion is by a Rayfield, which is of a special design to meet the needs of the Winton motor. In order to facilitate gasification of the fuel it is both hot waterjacketed and equipped for hot-air supply. To take care of the changes in adjustment of mixture due to different temperature conditions there is a gasoline primer operated from the cowl board and also a dash air control.

Lubrication is by pressure feed, the oil being circulated by a plunger pump located in the lower half of the crankcase. This pump is driven by spiral gears from the camshaft and takes the oil through a screen from the reservoir and delivers it through a tube cast in the crankcase to the main bearing. From these points the oil enters conduits drilled in the crankshaft through which it passes to the lower connecting rod bearings and also by means of a tube to the front chain and sprockets. The cylinders, camshaft bearings and cams are fed by the oil which is thrown from the connecting rods, and in order to distribute the oil completely around the periphery of the cylinders oil grooves are cut around the pistons. Other parts of the car such as the steering connections and spring bolts are provided with grease cups while the springs are taken care of by Dann lubrication cushion inserts.

Smaller Motor Almost Identical

The description of the 48 motor fits the 33 except that the dimensions of the latter are 3¼ by 5¼ and the S. A. E. rating is 33.75 hp. The equipment and general detail of design is the same in both instances. Throughout the remaining chassis specifications a marked similarity also exists. Both cars have dry plate clutches with seventeen disks in the 48 and eleven disks in the 33. Both cars have four-speed gear boxes with direct drive on third speed through internal and external gear combination. There is a lockout mechanism on reverse and final drive is by a shaft which is practically horizontal under normal load. At each end of this propeller shaft is a universal joint internally lubricated and inclosed in a grease-proof metallic case. Torque is absorbed through a torsion rod extending from the rear axle case to a cross member of the frame. At the forward end of the rod there is a link with ball joint allowing of sufficient freedom of motion to give a flexible drive.

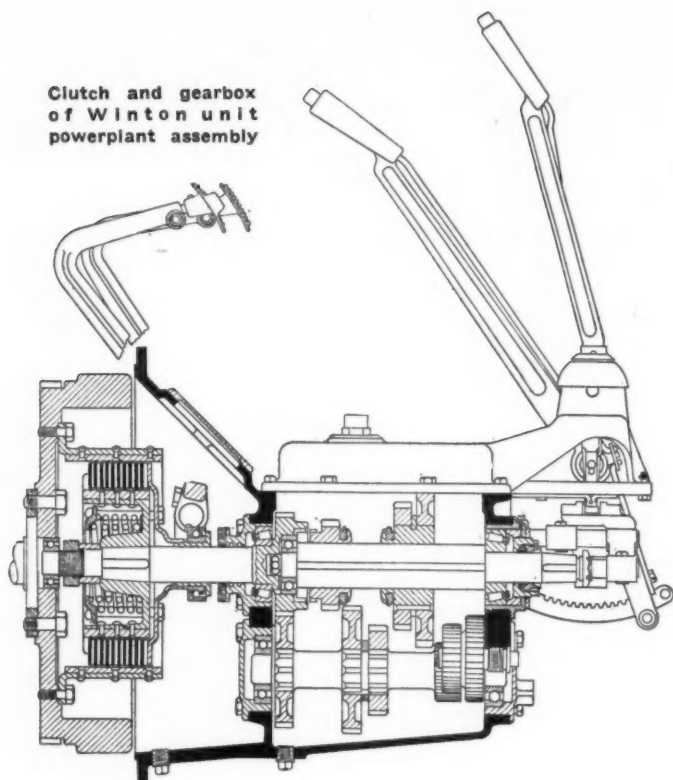
The front axles are Elliott type, I-beam section, integrally drop forged. The rear axle is floating, the housing which carries the weight being of pressed steel. The rear axle gears are spiral bevel with bevel gear differential. The material used in the gears and pinions is nickel steel and the bearing equipment is Timken roller throughout.

Some of the other important chassis specifications include 37 by 5 tires on the 48 and 36 by 4½ on the 33. Non-skid rears are furnished and the standard equipment is Firestone demountable rims. On the cowl board the equipment includes a combined lighting and ignition switch with Yale lock, ammeter, carburetor control, speedometer clock and gas primer. The instrument board is lighted by electric lamp. The windshield is a ventilating rain-vision design carried over the cowl board, and the cowl itself is of cast aluminum. Floor mat, foot rest and collapsible robe rail are included in the tonneau, and divided front seats are optional.

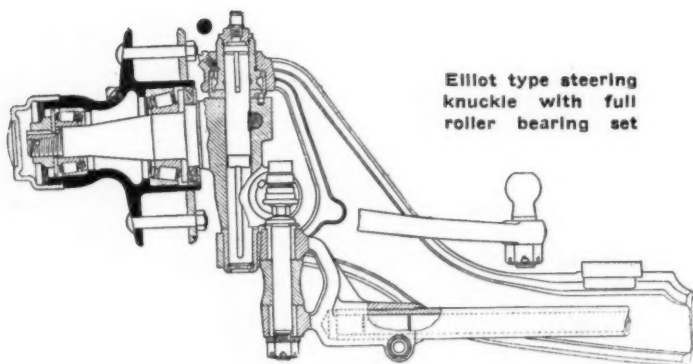
The Winton company pay particular attention to the finish of their cars and will supply bodies furnished in any color, and will also make special prices for sets of one chassis with two interchangeable bodies.

Details of Winton Sixes

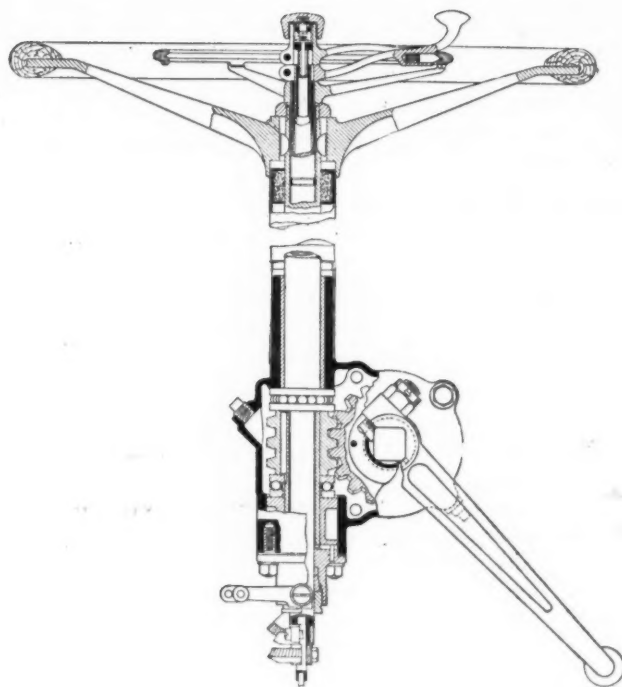
Clutch and gearbox
of Winton unit
powerplant assembly



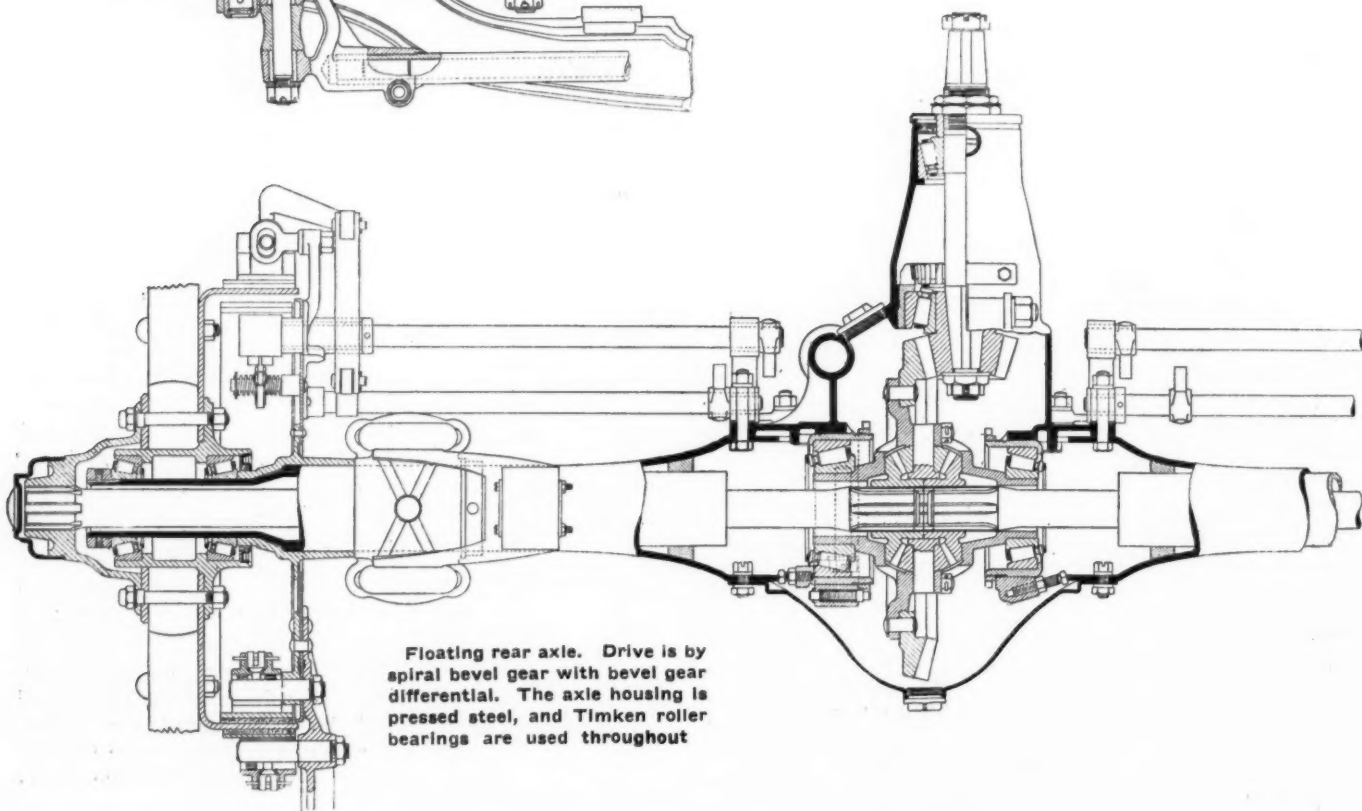
Elliot type steering
knuckle with full
roller bearing set



Steering column and control—Column held rigid by support attached to cowl board with worm and gear steering mechanism supported by long bearing surfaces. The steering mechanism is equipped with ball thrust bearings and the steering side rod has a ball joint at each end provided with springs to give flexibility and take road shock. Steering links adjustable



Floating rear axle. Drive is by spiral bevel gear with bevel gear differential. The axle housing is pressed steel, and Timken roller bearings are used throughout



The History of the American Automobile Industry—16

Hot Air Engine Subject of Many Experiments —
Hydrogen and Other Gas Engines Before 1800—Elec-
tric Ignition Used in 1807—Regenerative Air Engine

By David Beecroft

IN 1796 Lebon d'Humbersin of Paris received French patent No. 37 for a method of distilling gas from wood, closely following experiments in England by Murdock and others who distilled gas from coal. In 1801 he patented an air engine having three double-acting cylinders. Two of these were used respectively for air and gas which passed through a mixing chamber into a combustion chamber, where they burned and expanded and were then carried to the working cylinder. This device is therefore a very close anticipation of the Brayton engine of seventy-five years later, and, while right in general theory, undoubtedly gave much trouble because of the difficulty of handling and the losses involved in attempting to carry the red-hot gases from the combustion chamber through valves and pipes to the working cylinder. Lebon was assassinated soon after devising this motor and the work ceased.

Cayley's Engine on Practical Lines

He was closely followed, however, by Sir George Cayley, who, in 1807, brought out his hot-air engine and presented it to the public instead of patenting it. His device is particularly worthy of attention because it has finally led through many steps of improvement to the modern internal combustion engine that is driving the great majority of modern automobiles. He patented in 1837 the application of this engine to an automobile, which shows a well worked out device having two or more cylinders, water cooling and self starting so long as the fire was burning. The Cayley device is simplicity itself in conception, but offered a goodly number of difficulties in the attempt to carry it out, particularly in attempting to secure high economy, low first cost, long life and similar important features.

This engine pumped atmospheric air into the ash box of a tight furnace, which air passing through the flame or burning fuel was intensely heated, mingled with the combustion gases and, greatly expanded, was then sent to the working cylinder which it operated, just as steam operated the steam engine, after which it was exhausted. The pressure was, of course, limited to that which might be readily secured by the compression pump. The amount of heating could be much or little, as

desired, by passing part of the air around the fire, but whether much or little it was still very high for the inferior lubrication, poor workmanship and inferior materials of those days. Speeds were low and the grit from the fuel undoubtedly quickly destroyed the valves and piston rings. That very little came of this device at this time is not surprising under these circumstances. It would show really practical results to-day.

Use of Electric Ignition

Some modification of it would seem to be particularly advantageous for converting the heat energy of peat into mechanical power, because a wet fuel would tend to develop much steam with consequent high internal pressure and low internal heat, and thus avoid the destruction of the metallic parts and the necessity for great exterior cooling found in most of the hot air engines.

So far the electric spark, although known, seems not to have been used for gas engine ignition, although suggested for firing guns by Benjamin Franklin in 1751 and by Joseph Priestley in 1761, and for air engines by Lebon in 1801. It is claimed that in 1807 de Rivaz actually constructed an engine employing hydrogen and air fired by an electric spark. He is said to have used a cylinder of about $4\frac{3}{4}$ in. diameter and to have applied his engine to a small locomotive. It is quite probable that this was also of the open-cylinder, free-piston type. The hot-air engines having continuous fires did not need electric ignition, and liquid or gas fuels were not common.

The Stirling Engine

In 1816 Rev. W. Stirling, Scotland, invented a hot-air engine, afterward patented in 1827 and 1840, which used the same air over and over and employed a displacer piston instead of a pump piston, in addition to the working piston. The displacer cylinder was cooled and the working cylinder kept hot by a fire, and the total volume of contained air would be expanded or contracted according to whether it was thrown by the pistons into the hot cylinder or into the cool one. The working piston would be pushed outward by the expanded air and sucked inward by the contracting air. No

valves were necessary and the displacer piston was very light, being hollow, and was usually carried by its piston rod so that it required no oil and caused little or no friction. This form of engine found considerable favor and grew in popularity until the end of the century, when it began to be displaced by the smaller, lighter and cheaper now common gas engine.

Even more important than the engine was the "regenerator" or "economizer," which he employed between the hot and cool cylinders to absorb the heat of the air as it passed toward the cool one and to again give it out as the air passed toward the hot cylinder, which arrangement added much to the economy of the device. This regenerator has found extensive use in many industries where high heat is needed and many metallurgical processes would not be profitable and often not possible without it.

Some Leakage of Air

While the above description applies to the Stirling engine as usually made, it was found that there were some losses of air by leakage, and that unless this leakage was made up in some manner the air became so rarified that it had little heat-absorbing capacity, and the engine lost power. On this account it was common not to attempt to get power from the vacuum, but to provide a check valve opening inward which would admit atmospheric air and so maintain the working medium.

A 50-hp. Stirling was used for some years at a Dundee foundry in which the air was maintained under about 200 lbs. compression by a pump, showing even at that date recognition of the fact that this compression permitted more power from a given size engine. Its bore was 16 in. and stroke 48 in. Several reports are extant of the efficiency of this device, the lowest one being 8.5 per cent, which is probably closely correct. It was abandoned after a few years because of failure of the heating surfaces. Modern materials and methods of treating them would have prolonged its life many times.

In 1820, before the Cambridge, England, Philosophical Society, Rev. W. Cecil described an engine using hydrogen gas and air to produce an explosion followed by a vacuum. His engine ran with perfect regularity 60 r.p.m., using 17.6 cu. ft. of hydrogen per hour. He explained that his engine could be used either direct acting or on the gravity system. By the former we understand the now common practice of using the pressure of the expanded charge, and by the gravity system we understand that which was common in those early days and after adopted by Otto & Langen in their free-piston engine, which is well known to most present-day gas engineers. In those days of low pressures there was considerable question as to which method was the better. Although it was not until about 1862 that Alph. Beau de Rochas explained to the world with perfect clearness the cycle of operations now widely used, Sadi Carnot had correctly stated the important heat laws about 1826 and it seems to have been fully understood even in those days that a rapid expansion of the gases was necessary in

order to get good power and high economy. In fact, any observer could hardly avoid noticing the cooling effect and loss of power so plainly evident in the first explosions of a cold, slow-moving engine. Rochas' requirements were stated as (1) the greatest possible cylinder volume with the least cooling surface; (2) the greatest possible rapidity of explosion; (3) the greatest possible pressure at the beginning of expansion; and (4) the greatest possible expansion. It is not likely that these earlier experimenters grasped the problem so fully as did Rochas, but it seems certain that they were hindered more by the mechanical difficulties than by a lack of knowledge just as Rochas himself did not carry out his own theories, but left them to be embodied by Otto 14 years later.

Rev. Cecil also describes some earlier experiments by Professor Farish, who exhibited in his lectures an engine working by the explosion of air and gas. It is also said that Farish had operated an engine by gunpowder. These engines of Cecil and Farish seemed to be the first well-authenticated, actually working devices of the internal combustion kind. Their exact construction is not clear, but Cecil seems to have used two pistons in connection with a single combustion chamber.

Great Activity After 1820

With the rapidly improving roads, a rapidly extending commerce, and a greatly increased use of the steam engine as a source of power, it was but natural that the period beginning about 1820 should be marked by great activity in the motor vehicle line in England. Naturally this activity was known in other lands and partly responsible for some of the efforts put forth both in France and America. Undoubtedly the growing use of the steam engine even with its many imperfections stimulated at first, at least, attempts to propel vehicles with other sources of power, among which were hot air, already mentioned, rarified air and compressed air. While the advantage of compressed air for doing work at a distance was not unknown, it seems that very little use thereof had been made in these earlier experiments. British patents issued to George Medhurst in 1799 and 1800 describe "A condensing wind engine for all of the purposes in which steam, water, wind or horses are employed." Also "A new improved method of driving carriages of all kinds without the use of horses by an improved Eolian engine, which may be applied to various other useful purposes." Medhurst further describes that this air may be stored by manual power, by water power, by wind power or by explosive or effervescent substances. He also describes various work that may be performed by his devices and mentions charging stations as well as portable reservoirs or magazines.

Small carriages were to be driven by rotary engines, the larger to have reciprocating engines with speed changing gear. He also describes a gunpowder engine in connection with an artillery wagon. Medhurst designed a pneumatic tube system and published several pamphlets that the knowledge of his inventions might be disseminated.

The FORUM

Improving the Steering

By A. Ludlow Clayden

IN reply to Mr. Duryea, I must confess that his method of describing the action of bicycle steering is better than mine was. We both meant precisely the same thing, but Mr. Duryea has chosen a better method of expression. However, as to the tilted pivot being the same thing as a pivot placed centrally in the wheel, I must retain my former opinion that it is not and never can be the same. Of course the turning moment of a blow struck on the wheel by an obstacle in the road is lessened by tilting the pivot, and if the pivot angularity is increased, so will the turning moment be reduced, but it cannot be brought down to nothing.

Certainly the old Duryea cars which I enjoyed driving ten years ago or more, did steer well, but the details of their steering were good and the pressures on the various parts were light. Also, and this I think is important, the long tiller for steering, without reduction gearing, gave one the ability to "feel" the steering. Driving a Duryea on a good road was more like steering a boat in smooth water than controlling an ordinary automobile. On rough roads it was always my experience that one was wise to keep a good grip of the tiller, but that may have been because road shocks are so often of a slightly glancing nature with a distinct horizontal component.

Future for Light-Weight Tractor

By Marius C. Krarup

In reading the extracts from Mr. Eason's paper on the development of tractors and their manufacture, I notice a number of reasons for the inclination of manufacturers to stick to the traditional heavy and crude construction with cheap materials, but I find no mention of the most important factor which makes them so conservative. This is the need of great weight over the tractor wheels to make them pull and overcome great resistance.

Cleats, or adjustable traction blades projecting more or less from the wheel rims are indispensable on soft ground even when the tractor is heavy and can only to a very limited extent take the part of weight for securing the necessary tractive effort. They are troublesome on the road and on hard fallow ground; they cause vibration which is injurious to a light-weight power plant and mechanism designed on the automobile plan, and they militate against the speed which should contribute to making the motor tractor pay for itself. In other words, the tractor system dispensing with heavy-weight construction has not yet been satisfactorily developed. The best that can be done with a light-weight tractor at present is to load it down when it is to do heavy work—likewise as a man jumps upon the back of a light mule to make it pull as much as a horse—or else to use the caterpillar tractor system, which, however, is not adapted for small and inexpensive farm machines.

Rational efforts for introducing light-weight automobile construction for farm work must therefore be aimed first of all at revolutionizing the propulsive system. To make

OLD DURYEA CAR
STEERED EASILY—
OBJECT OF HEAVY
CONSTRUCTION FOR
TRACTORS—THICK
BRAKE DRUM RE-
DUCES HEATING

the work done in the soil push or pull the power plant ahead, or to make it help in doing so, is the most radical thought in this connection. The Lanz machines and the von Meyenburg machines are the best examples of this principle. The soil is milled by tools rotating in the same sense as tractor wheels, and the resistance of the soil against the movement of the tools therefore assists in propulsion. But the work done is not plowing or harrowing. (The rotary disk harrow operates the other way, and does only light work, comparatively.) It is soil-tilling on a new plan, to which farmers must first become reconciled. The work done per acre consumes, so far, from 1.7 to 2 times as much motor fuel as plain plowing, but separate harrowing can in many cases be spared, as the new tools divide the soil much more finely than the plough does. The returns in the form of increased crops or final economy in cultivation are not yet proved.

One of the strongest mechanical objections to soil-milling, with the methods and soil tools which have so far been tried in public, is the necessity for rotating the tools very rapidly—approximately four times as fast at the prongs of the tools as the linear forward speed of the machine as a whole—the result of which is that these tools are easily broken or injured when striking stones in the soil. Another objection is that when the soil resistance is great the milling is slighted and the propulsion is favored.

Brake Drum Thickness Affects Heating

By E. H. Delling

Chief Engineer Mercer Automobile Co.

I have read Mr. Booth's article, "Working Out of the Rolls-Royce Brake," with interest, and find that our experience in the designing of a brake has been very similar to his.

We have had trouble with accumulating a great deal of heat in the brake drum of the propellor shaft brake, due to the fact that the shoes with asbestos lining are insulated and cannot therefore conduct the heat away. We are using a high carbon steel casting for our brake drum at present, incorporating cooling ribs on the outside.

We found we still could bring the brake drum to a black heat when abusing the brake violently in succession. We increased the thickness of the wall of the brake drum only 1/32-in., and this slight change made a wonderful difference. We can only bring these brakes to a dark yellow at present, which we think is not a dangerous heat in a brake of this type. We might add that our brake shoes are made of aluminum.

Tipton Uses Balanced Rotating Sleeve

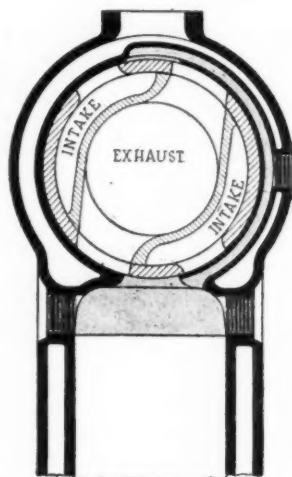
Cored Passage for Inlet and Central Bore for Exhaust in Overhead Construction—Unique Connecting Rod, Flywheel and Crankshaft Assemblies

A UNIQUE form of sleeve valve motor has recently been designed by W. P. Tipton. It is intended to overcome inertia in the valve gear in high-speed motors by employing a rotary action.

The valve design is distinctive in that it has two concentric chambers, the inner for exhaust and the outer for inlet gases. On a $3\frac{1}{2}$ by 6-in. motor the valve diameter will be 5 in. and the area of the valve ports will be 4.844 sq. in. or 50 per cent of the piston area, a ratio which is suggestive of good action at high speeds where the greatest possible volumetric efficiency and the most reasonable gas speeds are desired.

The inlet gases are led to the combustion chamber by way of the annular bridged slot shown in the middle of the valve, which slot is connected to the carbureter through the inlet manifold. This construction is clearly shown in the longitudinal and transverse valve sections in the accompanying illustrations.

Accurate balance of the valve is secured by a second, diametrically disposed port of equal area, which distributes the gaseous pressure on either side of the valve. The passage for the gases to this balancing port is through a duct cored around the valve in the cylinder casting.



Section of Tipton Valve

The area of the valve surface passing the ports during the compression and expansion strokes is inclosed by four interlocking bars of cast iron lying in grooves in the valve shell and held against the valve walls by a flat steel spring in back of the bars. With a reasonable amount of lubrication it is intended that this design should assure a gas-tight fit, without reducing the clearance between the valve and the wall.

Provision is made against warping by using an outer shell of 5/16-in. steel tubing into which grooves for compression rings are cut, also the teeth at the forward end of the valve for guiding purposes. The exhaust passage is of cast iron and is lightly welded at all contact points to the outer shell. As the outer shell is partially cooled by inlet gases as well as by the water-jacketed walls, and as it is heated and cooled uniformly throughout its entire area and not locally, the designer states that uniform expansion should occur and the vastly greater strength of the outer shell will overcome the warping stresses set up in the cast-iron exhaust passages.

The bearing speed of the valve is low in comparison to that of the piston, the ratio being 428 to 1000; and, as its load is small lubrication should be simple. The designer takes care of this by a small force feed introduced at five points, one between each pair of cylinders.

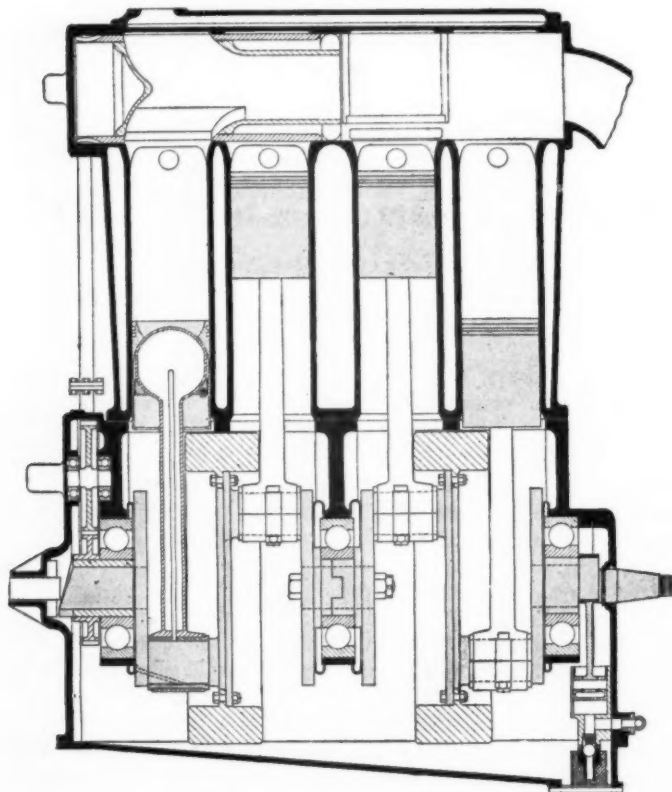
Another interesting part of the design is the ball-end connecting rod. This rod is tubular, having a flare at the upper end and a hemispherical pressed steel shell welded on. The entire end is ground spherical and an adjustable aluminum alloy guide is made with compression rings. With this construction the greater part of the explosive force is accepted directly by the connecting rod and the entire construction is intended to give light weight with good thermal conditions.

Referring to the crankshaft construction, it will be noted that two flywheels are used flanged to the counterbalanced crankshaft. The idea is to eliminate whipping of the shaft as the energy is stored up directly in the flywheel, without the necessity of the impulse passing through the entire shaft, thus causing a whipping action.

Lubrication is by force feed to the ball bearings, the overflow being caught by the four gutter rings and led through the drilled crank web to the connecting rod bearing, thence to the upper end of the piston through the copper tube within the rod.

A positively driven plunger pump keeps the engine base dry, forcing oil to a five-gallon tank. When the pump has cleaned out the base it draws in pure air and automatically maintains a pressure on the supply tank by means of a blow-off valve. The oil feed is connected with the throttle, thus adjusting oil supply to motor speed.

The entire design aims by means of large ports, positive timing, light-weight reciprocating parts and accurate balancing to avoid the difficulties of the higher rotative speeds and to show good performance in the upper ranges.



Tipton motor, showing spherical connecting rod end



The Rostrum

Offset Cam Distributes Follower Wear

EDITOR THE AUTOMOBILE:—Some gasoline motor manufacturer has designed an engine with an offset between the center lines of the camshaft and pushrod, as shown on my sketch. This motor is L-head type, 3¼ by 5, and valve opening is about ¼ in., and motor speed from minimum to high is approximately 800 to 1800 r.p.m. If there is any advantage in the above mentioned valve mechanism, kindly fully explain it.

Flint, Mich.

W. N. N.

—The advantage of the offset cam is that the cam tends to rotate the pushrod. The result is that the wear due to cam contact is distributed around the entire circumference of the circle of travel.

Field of Self-Lubricated Bearings

Editor THE AUTOMOBILE:—What are self-lubricating bearings?

2—Does this self-lubricating quality last as long as the life of the bearing?

3—For what special work are they used?

4—Are they fit for severe service, such as the crankshaft and camshaft bearings of a motor?

Washington, D. C.

R. A. E.

—Self-lubricating bearings are those in which the frictional qualities of the bearing liners are such that they do not require the use of an additional lubricant.

2—Not always. For instance, in the case of wooden bearings where a treatment is given the wood by impregnation with a certain substance it is often necessary to renew the treatment. Bearings of phosphor bronze and compressed graphite such as are used on brake shafts are claimed to last the life of the car.

3—They have a wide variety of uses, for example: in friction shock absorbers of certain types, wood friction disks are employed which are self lubricating and in marine work the last bearing of the propeller shaft is lined with lignum vitæ. This is a wood with lubricating qualities. As stated, the phosphor bronze and graphite are used in brake work and often for spring eye bushings.

Blitzen Benz Not a Stock Car

Editor THE AUTOMOBILE:—Is the Blitzen Benz car a stock made car in more than one model or just a racer?

2—I have a 1914 model H Hupmobile in which the water boils. It does this after running only two miles. Would you advise installing a pump, and if so how can this be done? Also, what make would you advise for this?

The radiator holds about 20 qt. of water and am using Panhard medium oil in this car. Is this all right? If not, what would you advise?

Chester, N. Y.

C. F. J.

—The Blitzen Benz is a racing car and not a stock design.

2—In checking up the motor to remedy the situation due to the boiling of the water the following steps should be taken:

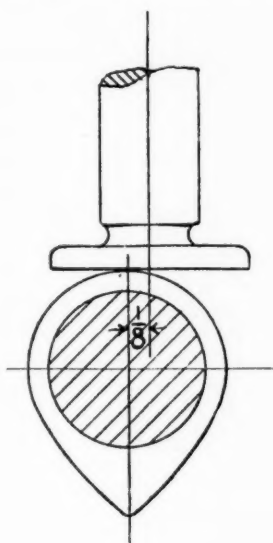


Fig. 1—Offset cam and follower

1—See that timing is proper.

2—See that the valves are not riding. The proper adjustment is between 0.004 and 0.006 in.

3—See that spark is advanced as far as possible without causing a knock.

4—Make sure that there are no constrictions in the water passages and that the radiator is clean. The radiator can be flushed out with a solution of soda and then thoroughly irrigated by connecting a hose to the bottom and allowing it to run under city pressure. The same method should be used in cleaning the water-jackets.

5—Be sure that the carbon deposits are removed and that you are using a good grade of cylinder oil.

6—Be sure that the muffler is not clogged, giving excess back pressure.

7—Do not allow the clutch to slip nor the brakes to drag.

8—See that the gasoline mixture is not too rich and make sure that the carburetor is not flooding.

9—The fan belt must be tight so as not to allow the fan to slip while the motor is running.

10—Clean the oil screen so that the circulating system will be sure to operate properly.

Calculated Horsepower by Formula

Editor THE AUTOMOBILE:—Please tell me how to find the horsepower of automobiles?

2—What is the horsepower of a car that is 3¼ by 5 in.?

Jamestown, N. Y.

K. B.

—The horsepower of a motor is calculated by squaring the bore, multiplying by the number of cylinders and dividing by 2.5.

2—The formula horsepower for a car having a bore and stroke of 3¼ by 5 in. is 16.90 for a four; 25.35 for a six; 33.80 for an eight and 50.70 for a twelve.

Kerosene Not Good for Radiator Use

Editor THE AUTOMOBILE:—Could coal oil be used in the radiator of Maxwell model 25 this winter instead of water?

Laurelville, Ohio.

W. P. DeH.

—It is inadvisable to use coal oil in the radiator of a car. The first warm day will cause such rapid evaporation that serious harm is apt to be done the motor by overheating.

Carburetion Not More Complicated on the Six

Editor THE AUTOMOBILE:—I would like you to explain to me in what way six-cylinder carburetion is more complicated than on a four. In other words, why is carburetion more complicated on a six than a four? What is the reason for this? High authority claims that a six is not as efficient as a four for the same piston displacement. Why is this? What is it about a six that accounts for this lack of efficiency?

2—Is a six of standard make subject to vibration up to 1500 r.p.m.?

3—Is not a four-cylinder motor as satisfactory up to 300 cu. in. and 3000 lb. weight as any six?

Beemer, Neb.

GROVER SHARP.

—Carburetion difficulties are hardly more complicated on the six than they are on the four. One of the reasons advanced for less thermal efficiency in the six than in the four is the fact that there is more cooling wall area per unit of displacement in the six than in the four. However, it is generally maintained by six-cylinder manufacturers that the gains in balance, etc., more than make up for the possible losses in thermal efficiency.

2—This you can readily determine by actual experiment. It all depends on how well the motor is balanced.

3—This is another matter of personal opinion. If one were better than the other to such a degree that the opinion was unanimous the other type would surely be abandoned.

Cutout of No Benefit to Motor

Editor THE AUTOMOBILE:—Kindly let me know through THE AUTOMOBILE of what benefit a muffler cutout is to a motor.

Hazleton, Pa.

H. M. S.

—No direct benefit or harm results to the motor from the installation of a muffler cutout. Many motorists like to listen to the sound of the exhaust but it is unfortunately true that the use of the cutout is often abused.

Auxiliary Exhaust's Added Complications

Editor THE AUTOMOBILE:—Does any automobile manufacturer employ an auxiliary exhaust in the construction of their motor? If not why? It is used on some makes of stationary engines to advantage and would seem to be practical for use in automobile motors and particularly in those of the valve-in-head type. It would certainly relieve the valves of a considerable amount of heat due to the sweeping of the hot exhaust gases directly against them. I have reference to the vertical type of valve and would make for more complete scavenging of the cylinders of the burned gases and result in greater power and efficiency.

Webster, N. Y.

G. J. A.

—No auxiliary exhaust valves are used at the present time. The reason for this is that it has been possible to design the exhaust valves to take care of all the gas flow. Besides, with one set of valves the manifolding arrangements are much simplified.

Balancing Single-Cylinder Vertical Motor

Editor THE AUTOMOBILE:—Kindly explain by sketch and description how to balance a vertical 4 by 5 high speed single cylinder four-cycle air-cooled motor. The flywheel is inclosed in the crankcase having a 9-in. diameter and weighs 30 lb.

2—What clearance would you allow for expansion in this motor using light alloy pistons?

Portland, Ore.

A. W.

—Balance of a single-cylinder motor is effected by crankshaft counterweights and heavy flywheel to maintain the minimum variation in angular velocity of the crankshaft.

2—The clearances used with the light alloy pistons are about double those of the cast-iron type.

Compares L-Head and I-Head Motors

Editor THE AUTOMOBILE:—Will a 4 by 4½ valve-in-head motor develop more power than the same size poppet valve motor?

2—Will the above size engine consume more or less gasoline than the poppet valve motor?

3—How will a Knight motor, say 4 by 4½, compare with a poppet valve and valve-in-head motor as to gasoline consumption and power?

4—Will a poppet valve motor have the same compression as a valve-in-head motor?

5—Does it take more or less power to open the valve of a valve-in-head motor than the valve of a poppet valve motor?

6—If you had a poppet valve motor having the same size valves as a valve-in-head motor, which type of motor would develop more power and which would consume more gasoline?

Manitowoc, Wis.

J. A. R.

—The probabilities are that the maximum power will be higher due to the more advantageous shape of combustion chamber.

2—There will be no material difference.

3—This depends on individual design.

4—This also depends on individual design.

5—About the same.

6—The efficiency would probably be a little in favor of the valve-in-head type due to the advantageous combustion chamber form. The whole question, however, is one of individual design, as a poor valve-in-the-head motor would not perform as well as a good L-head and vice versa.

Current Regulation of Delco Buick 25

Editor THE AUTOMOBILE:—How is the regulation of current taken care of in Delco system used on a model 25 Buick?

2—In assembling a Ford motor does it make any difference which side of the motor you place the connecting-rod which has the bolt through it at the top making one side heavier than the other?

Blanchard, Iowa.

R. H.

—Regulation is taken care of by the inherent qualities of the field winding of the motor generator. This is a reverse series winding.

2—It makes no difference.

Timing of Rotary Valve in Elmore Motor

Editor THE AUTOMOBILE:—Please give timing of rotary gas valve in relation to the piston position on a 1912 model large four-cylinder Elmore.

2—What motor, if any, is interchangeable with the above, meaning four cycle motor?

C. BROS.

Clarksburg, W. Va.

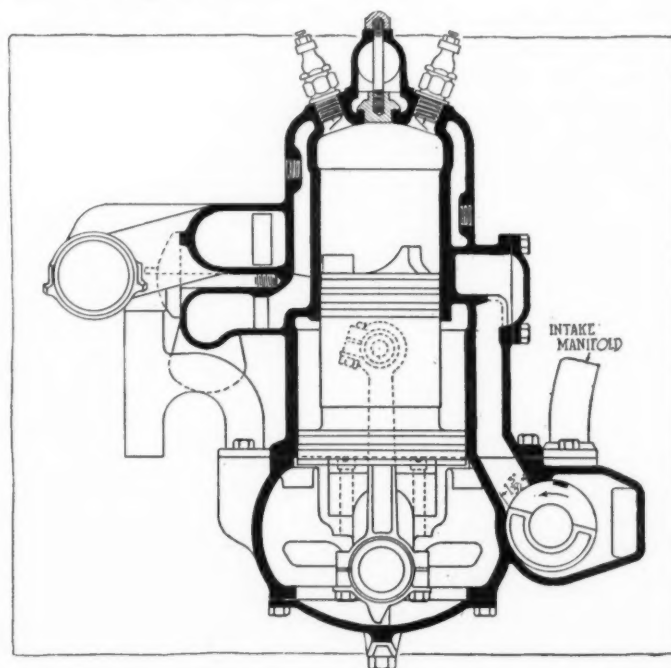


Fig. 2—Section through Elmore showing valve at lower center

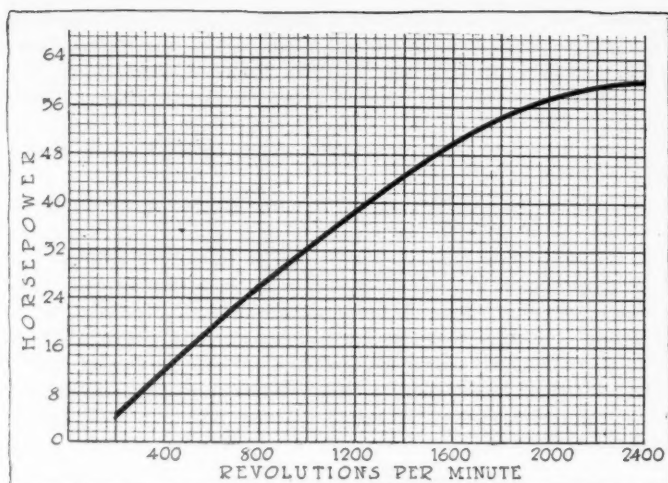


Fig. 3—Horsepower curve of Cadillac Eight for 1916

—The accompanying section of the Elmore motor in Fig. 2 will give an idea of the timing.

2—No motor of which THE AUTOMOBILE has any record is interchangeable with the Elmore. It is not difficult, however, to bolt or rivet a sub frame for installing another motor.

Can't Charge from Alternating Current

Editor THE AUTOMOBILE:—A man owning a Ford states that he is going to buy a storage battery and a regulator. He claims he can keep his storage battery charged from the magneto with which the car was equipped. Can that be done? What would it cost?

The battery is to be used for lighting only.

Adams, Minn.

J. A.

—It is impossible to use any form of storage battery with a Ford magneto because the current produced by this magneto is alternating.

Wants Parts for Old Dragon Car

Editor THE AUTOMOBILE:—I have a Dragon car with a Buick M-17 rear end, 32 by 3½ wheels. Can I use to advantage 34 by 4 wheels?

2—If I have a plate ¾ in. thick placed on the end of each valve plug, will I get any advantage from the higher compression?

3—What is best carbureter to use on this type of motor, the intake manifold has been shortened 3 in. to bring the carbureter higher and nearer the cylinders. Is that an advantage?

4—Did the Dragon firm make the motor? If not, whose make was it?

Trenton, N. J.

W. R. D.

—The oversize tires for the 32 by 3½ are 33 by 4 and possibly you would save money and secure all the advantages by employing these tires instead of fitting entire new wheels.

2—No.

3—Any standard design of carbureter will be satisfactory. Shortening the intake is an advantage with the present heavy fuel.

4—Yes. You can secure parts for this car from the Philadelphia Machine Works, Philadelphia, Pa., or the Gorson Automobile Exchange, Philadelphia, Pa.

Grabbing Clutch Is Hard on Gears

Editor THE AUTOMOBILE:—We have a car which is continually stripping differential drive gears. The clutch is so savage that it is nearly impossible to start the car without

jumping. We have used Neatsfoot oil and adjusted the tension on the springs under the leather and when you get it so that the clutch will take hold easy it spins so that you cannot get into the gears when the car is standing.

Have you any suggestions to offer that might be of benefit to us?

Portales, N. M.

E. L. K.

—The clutch and universal assembly used on this model has to be treated very carefully in order to secure satisfactory operation. The best thing to do is to adjust the insert springs so the clutch will engage smoothly and then put on a clutch brake which will slow it up when fully disengaged. This clutch brake must be so located as to have no effect on the clutch until it is thrown out to the limit. If the clutch brake is located so close that it serves as a resistance when it is not fully disengaged it will make shifting from first to second and from second to third very unsatisfactory. Even with this adjustment it will be necessary for the operator to be very careful in the action of his feet when shifting gears. Another suggestion is that the spline shaft between the universal be kept well lubricated.

Valve Timing for Model E Maxwell

Editor THE AUTOMOBILE:—Please give the valve timing which will give maximum power for model E Maxwell.

Hickory, N. C.

G. G. W.

—Inlet valve opens 15 deg. late and closes 40 deg. late, these dimensions being 2.387 and 6.633 in. respectively on the flywheel. The exhaust opens 40 deg. early and closes 10 deg. late or 6.633 and 1.691 in. respectively on the flywheel.

Charging Battery from 550-Volt D. C.

Editor THE AUTOMOBILE:—Would it be possible to reduce a 550-volt D. C. current to a voltage suitable for recharging storage batteries such as are used on automobiles for starting and lighting purposes?

2—Could you furnish me a sketch or drawing showing how this could be done with the least expense? Would like to have the most simple method possible as I wish to do the installation myself.

Windber, Pa.

R. M. S.

—In charging a starting and lighting battery from a 550-volt D. C. circuit it would be necessary to install sufficient resistance so that the drop across it would be 542½ volts for a 6-volt battery, 535 volts for a 12-volt battery, etc. In the first instance you are utilizing only $7\frac{1}{2} \div 550$ of the energy and in the second case $15 \div 550$, or 1.36 and 2.72 per cents respectively. It is seen from this that this would be an extremely wasteful method of charging batteries. It can, however, be done, and about the simplest method is to use six strings of 32 c. p. carbon lamps. Strung in groups of five across the positive battery and positive 550-volt D. C. current line. One string of five lamps is lighted for every ampere of charging current desired. The lamps used are the regulation 110-volt 32 c. p. carbon lamps screwed in porcelain sockets, mounted on a board, covered with transite or asbestos board. A wiring diagram of this is given in Fig. 4.

Details of the Cutting Model T

Editor THE AUTOMOBILE:—I have a 1913 model T 35 Cutting car geared 3½ to 1 of which you will kindly answer the following questions:

1—The S. A. E. rating?

2—Probable cause of the car not being able to make more than 35 m.p.h. seemingly at best?

3—The cause of the clutch rattling when disengaged and car is running idle?

4—Where parts can be obtained at lowest prices for said car?

5—Whether car is equipped with Wisconsin engine and whether parts for same can be obtained from Wisconsin Motor Co.?

Danielsville, Pa.

W. L. P.

—The S. A. E. rating of this car is 25.60. It had a bore of 4 and a stroke of 5 in.

2—Probably leaky pistons, worn cams, worn timing gears, worn cylinders and loss of compression due to the above and possibly to improper valve seating.

3—Clutch disks worn and also worn keys on clutch drum.

4—Puritan Machine Co., Detroit, Mich.

5—Answered under question 4. THE AUTOMOBILE has no record as to the manufacturer of the motor.

Cadillac Horsepower Curves Are Similar

Editor THE AUTOMOBILE:—Kindly give me the power curves of the 1915 and 1916 Cadillac eights?

Burlington, Vt.

H. W. F.

—The horsepower curves for the 1915 and 1916 Cadillac eights are similar. The curve is shown in Fig. 3.

Lamps Use About One Watt per C.P.

Editor THE AUTOMOBILE:—Which consumes more current, a 32 c.p. nitrogen tungsten lamp, 7-volt, or a 15 c.p. mazda tungsten, 7-volt?

Montclair, N. J.

S. L. G.

—The 32 c.p. lamp will consume about double the current of the 15 c.p. On the tungsten lamps the current consumption is just about 1 watt per c.p. but on the nitrogen lamp it is slightly less than 1 watt.

Oxygen-Carbon Burning Will Not Harm Piston

Editor THE AUTOMOBILE:—Is the oxygen decarbonizing system successful and will it affect aluminum pistons or piston rings?

St. Louis, Mo.

A. R. C.

—The oxygen method of removing carbon is successful. It will not harm aluminum pistons since the action, after the burning has once started, is catalytic and local. The instant the carbon is burned off in a certain locality the combustion in that area ceases.

Sand Hole in Piston Causes Misfiring

Editor THE AUTOMOBILE:—I have a Premier 6-60 1912. When running idle number six cylinder will not fire, but when given more throttle, it will and runs smoothly when speeded up. There is the same compression in this cylinder as in the others.

I have put more tension on exhaust spring so there is not any chance of lifting it on suction stroke. I have put felt washer on intake valve stem in case there was false air getting in around the stem, also put felt washer on number five valve stem. The spark plug is firing all right, at least it does not become dirty. I have changed the plugs from another cylinder, without results. I have also decarbonized and ground the valves.

2—My Remy generator has stopped charging. I have tested the fuse and found it all right. I took the relay off, cleaned the brushes and commutator then when it was started it charged, but the engine sat idle for a day and when started again it failed to charge. On pressing the platinum points together on the automatic relay, it did not show any discharge on the ammeter, but when lights are on the ammeter shows discharge. Will be heartily grateful for anything you may be able to offer on this subject.

Bangor, Me.

P. R. W.

—This probably is due to manifold trouble, if the motor is in sound condition throughout. The manifold on the 1912 car may have acted satisfactorily with the gasoline secured at that time, but with the present heavy grade the proba-

bilities are that a good firing mixture is not obtained at idling speeds in the No. 6 cylinder. It is suggested, however, that before giving up the idea of remedying the trouble you remove the piston from No. 6 cylinder and examine it for sand holes, especially under the rings, and also examine the rings for bearing surface around their entire circumference.

2—Although you do not give sufficient data to diagnose accurately the trouble the majority of similar complaints are due to loose connections. Therefore, it is suggested that the first possible cause of the trouble is a break in the generator charging line. A loose connection at the relay or a loose or broken connection or broken wire in the generator charging line will, of course, prevent the generator from charging the battery and would prevent a discharge reading on the ammeter when the relay contact points are placed in contact.

You state that you have examined the relay fuse and found it all right. However, it is suggested that you pinch the fuse clips a little closer together to be sure that these clips are making good contact with the ends of the fuse.

As a third possible cause of this trouble, there may be a small quantity of dust or dirt between the relay points. A very fine piece of sandpaper should be drawn lightly between these points and all dust carefully removed. A very small quantity of dust or dirt lodged between the points might prevent them from making good contact and would therefore prevent the generator from charging.

Kerosene Carbureter Details Not Available

Editor THE AUTOMOBILE:—Kindly give me a description and cut of the Holley kerosene carbureter as stated in THE AUTOMOBILE of Sept. 20, page 584, which is used on the Ford tractor.

2—Kindly give cut of the Ellmore two-cycle engine.

Barberton, Ohio.

F. S.

—Details of the Holley kerosene carbureter will not be available until the device is put on the market. This will probably be coincident with the appearance of the Ford tractor.

2—The Ellmore two-cycle motor is shown in section in Fig. 2. Its operation is readily understood from the drawing, as it is a two-cycle motor with a simple rotary valve gas distributor.

Heavy Gasoline Makes Starting Difficult

Editor THE AUTOMOBILE:—I have been unable to start my Buick model 16 on a quarter turn, even when my valves are ground in good and tight, unless it is warm. What is the cause of this?

Lawrence, Mass.

C. E. C.

—This is probably a matter of low-grade fuel. As the quality of the fuel becomes poorer the motor will become naturally harder to start.

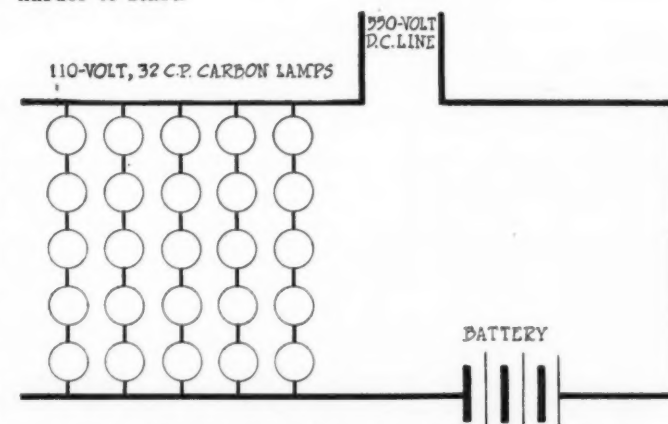


Fig. 4—Charging 3-cell battery from 550-volt D. C. line

British Trade in Strong Condition

War Orders Maintain Profits and Often Increase Them—Sunbeam Co. Earns 89 Per Cent

LONDON, Jan. 15—After one year's operation under war conditions, the British motor industry finds itself in a remarkably strong financial condition. It is only possible to judge with any degree of certainty the strength of those companies registered under the limited liability law and, in consequence, having a published balance sheet. In practically every case the net profit earned during the financial year ending on or about December, 1915, is greater than the earnings for the year 1914. In other words, the war has not had an adverse influence on the British automobile industry.

Sunbeam Profits Huge

The most notable balance sheet is that of the Sunbeam company, which shows a profit of more than \$1,200,000, and has paid a dividend of 25 per cent free of income tax. At the same time the company has placed \$600,000 to reserve, bringing this account up to \$1,100,000, and has carried forward a sum of \$378,335. The paid-up capital of the com-

pany is \$1,350,000, so that the profits of the year bear a very important relation to the capital employed. Further, the amount placed to reserve fund is larger than the net profit in any year in the history of the company, while the amount carried forward exceeds by \$25,000 the profits for the year immediately preceding the war.

The B. S. A. balance sheet, which also includes the Daimler company, is another conspicuous example of the prosperity of the British automobile industry. The company shows a profit of more than two million dollars and pays 20 per cent, compared with 15 for the previous year. The increased strength of the company is not revealed, however, by the dividend paid to stockholders, for the earnings have increased from \$950,000 in the 1914 financial year to more than \$2,040,000 during the last year. In addition to this, the company has put nearly two and a half million dollars to the general reserve fund.

Another case which calls for attention is that of the Darracq company, which is registered under English laws but has its factory in France. It is the only one on the adjoined list having a factory abroad. After paying no dividend for four years, the Darracq stock has yielded 7½ per cent, which is very much less than the directors might have paid out had it not been for the uncertainty regarding the future and the desire to strengthen the financial position. Thus the company has placed \$250,000 to general reserve, bringing this account up to its original figure of \$750,000; it has placed \$269,840 to special reserve and has carried forward \$85,720.

Dunlop Co. Does Well

The Dunlop Rubber Co. heads the entire list of automobile and kindred firms with a net profit of \$2,058,195, being a net increase on the previous year's trading of \$185,000. Here again the dividend is not by any means as high as would have been in ordinary times, the directors seeing the necessity of making substantial provision against possible lean years which may follow the war.

In the few cases where the dividend this year is less than for the previous twelve months, it can in nearly every instance be attributed to special circumstances, as, for instance, foreign investments, for which huge depreciations have to be allowed, or losses through branch houses or goods being held by the enemy. These, however, bear a very small proportion to the whole. It should be noted, too, that many of these balance sheets include the first two months of the war, when owing to failure to realize the extent and possible duration of the conflict some of the factories were standing idle or running below their full capacity.

Financially the position of the English and the French automobile manufacturing concerns is unusually strong, but this does not imply complete satisfaction on the part of those holding interests in them. The government scheme to tax a large proportion of the excess profits is not to the taste of interested parties. One outcome of this has been that the Darracq company has formed a French company to acquire the French factory, the whole of the stock, with the exception of the small amount necessary to comply with the law, being held by the British company. The main advantage

Firm	Last Div. Per Cent	Net Profit	General Reserve	Special Reserve	Carried Forw'd	Prev. Div. Per Cent
Belsize Motors	10	\$235,100	\$125,000	.....	\$51,560	7
B. S. A. and Daimler	20	2,042,275	567,455	.....	823,125	15
Brett's Stamping	20	48,000	.....	.....	.....	.....
Coventry Chain	10	109,865	.....	.....	.....	.....
Calthorpe	30	104,500	.....	.....	.....	15
Briton Motors	10	22,550	5,000	.....	.....	15
Darracq	7½	695,595	250,000	269,840	85,720	.....
Dunlop	20	2,058,195	875,000	.....	377,640	15
Dennis Bros.	15	586,100	200,000	125,000	56,745	10
Halley	15	110,195	.....	.....	.....	20
Humber	.....	320,730	.....	50,000	243,295	.....
Lucas Components	20	195,375	.....	.....	118,770	.....
Napier & Son	5	350,865	100,000	.....	49,195	3
Palmer Tires	12½	54,835	15,000	.....	6,565	12½
Rolls-Royce	10	384,250	100,000	92,500	147,515	10
Rover	10	327,505	150,000	87,500	201,800	40
Rudge Whitworth	10	165,500	.....	.....	.....	10
Singer	15	184,000	.....	.....	.....	10
Star Engineering	10	664,000	.....	.....	.....	10
Swift	7	91,000	.....	.....	.....	7
Sunbeam	25	1,206,780	600,000	20,000	378,335	15
Stepney Spare Wheel	5	44,810	20,000	77,420	66,630	10
Vauxhall	10	51,740	.....	50,000	28,825	.....

*Free of income tax.

Firm	Stock Quotations		Last Dividend Before War	Last Dividend Since War
	July 27, 1914	Jan. 12, 1916		
Austin	\$3.90	\$3.95	7	10
Belsize	5.34	5.04	10	10
B. S. A. and Daimler	10.14	9.68	10	20
Calcott	11.52	9.72	5	.....
Calthorpe	.....	12.60	.....	30
Charron	2.46	1.68	15	.....
Darracq	6.42	5.40	.....	7½
DeDion Bouton	1.50	1.74	.....	.....
Dennis Bros.	4.92	6.36	10	15
Dunlop Rubber	10.56	10.38	15	20
Humber	2.78	2.36	.....	5
Napier	3.78	.....	7½	.....
Riley	1.56	.....	.....	.....
Rolls-Royce	12.84	9.42	20	10
Rover	21.12	8.94	40	10
Rudge Whitworth	3.96	4.62	.....	10
Singer	10.56	10.92	.....	15
Star	2.34	4.80	.....	10
Sunbeam	8.94	11.58	33½	25
Swift	8.10	4.38	10	7

Tables showing stock quotations of leading British automobile companies on July 27, 1914, and on Jan. 12, 1916. In each case the nominal value of the stock is \$4.80. The tables also show the last dividend paid before the war, the last paid since the war, net profits, general reserve funds, etc.

of this is that the French taxation of war profits will be lower than that of England; it will also facilitate the firm in a certain degree in the securing of French war contracts. Under the conditions brought about by the war, English firms with factories in France—there are about half a dozen of them in the automobile industry—were liable to taxation both by the French and by the British.

The greatest strength of the British motor industry is not revealed in the summaries of its financial situation. While reserve funds are being built up and adequate dividends are being paid on common stock, immense sums are being expended on improvements and additions to the factories. The new plant put down since the war costs more than in normal times, but in most cases its cost will be wiped off by the war contracts already in hand. The result is that the end of the war ought to find the automobile industry sounder finan-

cially than at any previous period, and at the same time in possession of more modern and more completely equipped establishments.

Despite this, British manufacturers are not particularly joyful. There is a haunting fear that the end of the war will find America in possession of the home and colonial markets; the goodwill and trade names which have taken years to build up, are gradually diminishing until they may become insignificant factors. In this connection the war is tending to place the smallest firm on a level with the best. All, big and little, have to face the fact that American makers who would normally never have found a footing on the market, have now secured a strong position and will have to be competed against. In consequence, the feeling toward the American automobile industry is far from cordial. Of this more can be stated later.

Vesta Electro-Mechanical Clutch Proves Good on Trial

By Darwin S. Hatch

CHICAGO, Feb. 4—Not uncommonly, new ideas that seem to offer much when viewed on paper fail, in an actual trial, to live up to the expectations aroused by a study of their plans. Constructional difficulties sometimes make it impossible to get expected results by the practical application of a good theory. Hence, it is a pleasure to record the results of a drive in a car equipped with the new Vesta centrifugal electric clutch which was described in THE AUTOMOBILE for Jan. 27, of which the design promised a number of advantages over conventional transmission systems in the way of easier control and smoother running.

Actual handling of the car equipped with the new system proved a revelation as to what extent it is possible to convert the irregular impulses of the gasoline engine into smooth, even torque at the rear wheels.

Clutch Combines Generator

To recall the features of the design which was explained in detail in the earlier issue, the Vesta centrifugal electric generating clutch is a combined motor-generator which replaces the clutch, lighting generator and starting motor of the conventional car. There is a gearset which offers two or three speed reductions for emergency use, but under ordinary conditions, starting and running are on direct drive.

The idea of the new design is the utilization of a combination of the electromagnetic drag between the armature and fields of any electrical machine with a direct friction connection, such as is obtained in the ordinary clutch. The armature of the instrument constitutes the flywheel of the engine and the field is mounted on the forward end of the propeller shaft with a unique constant-mesh gearset between it and the propeller shaft. The fields are within the armature, so that the commutator is internal, and the brushes, which revolve with the driveshaft, press outwardly against the commutator. They are mounted in such a way that they press more heavily against the commutator as the speed increases.

At low speeds, or whenever the resistance of the rear wheels is too great for the centrifugal force to prevent slippage between brushes and commutator, the fields will start to revolve more rapidly than the armature and this difference in speed causes a current to be generated in the armature. This current flows around the field poles, making magnets of them, the magnetic drag thus caused drawing the armature around with the field. The greater the slip, the greater the magnetic pull. The excess current produced by variation in speed between armature and field goes to keep the battery charged. No current for the operation of

the clutch is taken from the battery except when the clutch is operated as a motor to crank the engine.

In view of the fact that there is no mechanical connection between engine and flywheel at low speeds, it is to be expected that the action of the car would be exceedingly smooth, and such proved to be the case. Even when starting with a cold motor, which missed and bucked as cold motors are wont to do, only the sound of the irregular explosions apprised us of the fact that the engine was not working smoothly. So far as the propulsion of the car was concerned, we might have had twelve cylinders under the bonnet instead of intermittent three and four.

The first view of a car equipped with the new system did not indicate much out of the ordinary. There was a slightly larger battery than usual. Also on the running-board there was a small metal box, which later was found to be the switch unit. The steering column offered the most to be seen. Under the steering wheel was a metal box, from the sides of which protruded four large buttons, about half the size of doornobs. There was neither gearshift nor emergency brake lever. Otherwise the car was normal.

Handling Is Easy

The handling of the car was very simple and easy, an overgrown button in the form of a knob was pulled out and the engine started. We pulled a second, or neutral button, which left the car ready to be started on high; then stepped on the accelerator and the car moved off, picking up in speed as the throttle was opened—and accelerating with surprising rapidity.

Then we tried to stall the engine. With a foot on either brake pedal and still on high speed we brought the car almost to a dead stop and still the engine kept running, even with the throttle fairly well closed. It is impossible to stall the motor by applying the brakes.

Running at 25 m.p.h. on high, we pushed another knob and without the slightest sensation of a jerk we were in low, the only evidence of the change being the slight click of the solenoid switch and the increased motor speed. There was no careful slowing down, holding out of clutch, shifting a lever, accompanied by grinding of gears, speeding up the engine, letting in the clutch, etc., that usually is necessary in dropping from a high to a lower speed with the conventional transmissions—we simply pulled knobs on the steering column and that was all. The gearset is operated electrically by knobs on the control box mounted on the steering column. Also it is of the constant-mesh type, so the gears

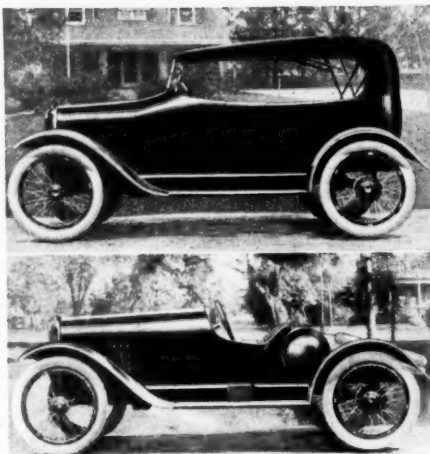
(Concluded on Page 299)

ACCESSORIES

Universal Specialties for Fords

THE Universal streamline tourabout body for Ford cars is of reinforced heavy gage steel, and the upholstery is deep and comfortable with spring cushions. Seats are wide and leg-room is ample. Guaranteed Boston Artificial Leather Co. fabric is the upholstery material used and the equipment includes robe and foot rails, scuff plates, carpet, lock plates and knobs. Fifteen painting operations insure the durability and high quality of the finish, the standard color being black with gold stripe, with special colors \$10 extra. The mohair khaki one-person top and rain-vision ventilating windshield, illustrated, are made especially for this body and will not fit the regular Ford type. The body sells for \$150; with the top and windshield as illustrated, \$38 extra. The Universal streamline radiator, of heavy steel well enameled and finished, with extra large cooling area, sells for \$45, f.o.b. Detroit, including special crank, hood clamp brackets, bolts, etc. The Spranger wire wheel recently described in THE AUTOMOBILE is sold for \$35 for a set of four wheels and five rims in red, green, black or yellow, including a rim wrench. These wheels, which are easily attached without bolts, front wheels coming complete with ball bearings and rear machined to proper taper and key seat, may be had in special colors for \$5 extra. The special crown fenders illustrated sell for \$14 a set.

The Universal streamline raceabout body for Fords, illustrated herewith, is similar in material and construction to



Ford cars fitted with Universal Car Equipment Co.'s special bodies, wheels, fenders, etc. The tourabout, above, has a special top and windshield

the tourabout, having deep, comfortable upholstery. This body, finished in red with black trim, hood and fenders being black and radiator black or nickel, sells for \$100, including 15-gal. fuel tank and spare tire carrier. Special colors are \$10 extra. Radiator and wire wheels, as described, may be fitted with this body.

Another Universal accessory is the one-person top for the regular Ford body, which is of the best material and easily raised or lowered. With Jiffy or plain curtains, rubber cloth, mohair or khaki, including top boot, this top sells for \$30.—Universal Car Equipment Co., Detroit, Mich.

Liquid Lustr Oil

This body polish is intended to prevent varnish from drying and cracking and is also claimed to neutralize the effects of alkaline soaps often used in washing cars by garagemen. The makers state that the polish may be used with impunity on any body surface as it will not injure lettering, crests or other ornamentations. The oil sells for 25 cents per 6-oz. bottle or 8-oz. can, or for 45 cents per pint can or 85 cents per quart.—Kenny & Moore, New York City.

Miller Double Focus Headlight

A new arrangement by means of which the dimming problem is handled by a double focus reflector and two lamps is illustrated herewith. The larger of the two lamps is intended for use only in country driving. The light from this lamp is directed horizontally and gives effective illumination of the road for a distance of 300 ft. or more according to

the candlepower used. The smaller lamp, which is also in focus, gives a light of lesser strength and is directed downward at an angle so that the road is illuminated ahead of the car for 75 or 100 ft. No light is projected above the level of the lamp. In passing another vehicle the dim light can be switched on without removing illumination from the road.—W. M. S. Miller, Milwaukee, Wis.

Johnson's Cleaner

This cleaner, which is for use either with or without Johnson's prepared wax, is claimed by the manufacturer to entirely remove all stains, discolorations, scum, road oil, tar and grease from a car. Even spots that have been ground in and scratches on the surface which seemed permanent are said to disappear at once upon application of the cleaner. The cleaner cannot possibly injure or scratch the varnish, simply cleaning it so that a coat of the prepared wax will produce a high finish. For old cars, both the cleaner and wax should be used, the cleaner being applied two or three times a year and the wax every six or eight weeks. For new cars the wax is sufficient to protect the finish from the ravages of wear and weather.—S. C. Johnson & Son, Racine, Wis.

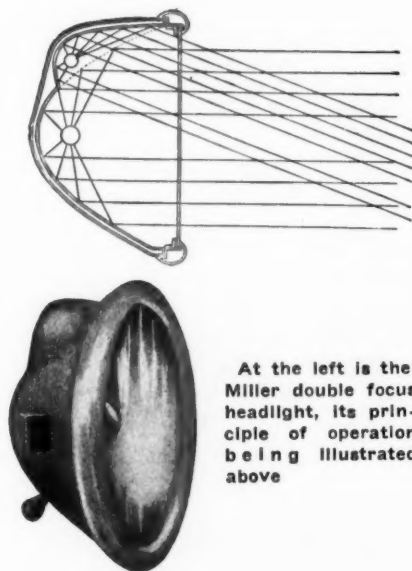
Bosch Systems for Small Cars

The ignition-lighting system for small cars combines the qualities of an independent high-tension magneto and a direct current, shunt-wound generator. Except that the two units are inclosed in one housing, they are distinct, either operating independently of the other, while the non-operation of one does not affect the other. The whole unit is 9¼ in. long overall, excluding the shaft, 8½ in. high and 4¼ in. wide, the weight of the unit being 25 lb.

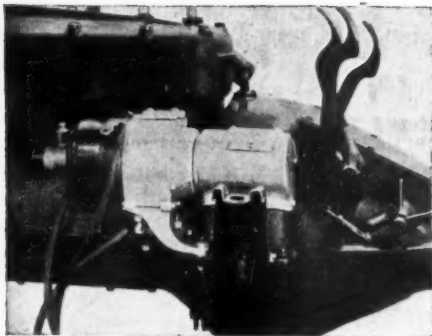
The connections of the ignition section of the device comprise only the cables between the distributor and the spark plugs. There is no coil, no separate timer, no complication of wiring, etc., the battery being used only in connection with the lighting section of the device.

The generator section is a direct current shunt-wound type while charging, but has an extra series field connected in series with a lighting switch. Thus all the lighting current passes through the series field, increasing the output of the device when running under load. The wiring is simple, consisting of a cable from battery to generator and another cable from the generator to the distribution switch. The normal capacity of the generator is 10 amp. at 7½ volts, equal to 75 watts.

The starting unit is separate and entirely independent, being mounted as illustrated at the left side of the motor,



At the left is the Miller double focus headlight, its principle of operation being illustrated above



Bosch starting motor for small cars, showing mounting on Ford flywheel

where it acts on a special split gear ring clamped to the flywheel.—Bosch Magneto Co., New York City.

Combination Tires

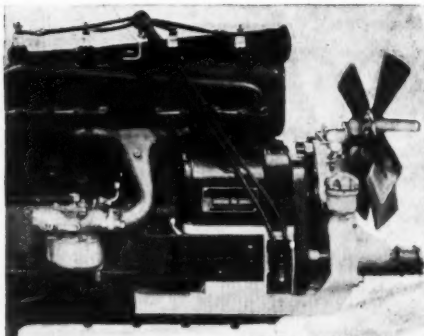
Combination tires are made with plain tread and in two styles of non-skid tread, both of the latter having depressed markings. Several layers of fabric are employed and in addition a double layer of fabric protects the cushion strip. The tread is of black rubber and a specially hand-constructed bead is employed which is said to be proof against rim-cutting or coming off the rim. Some of the list prices are as follows:

Size	Plain Tread	Hold-On Tread
30 x 3	\$10.85	\$12.70
30 x 3½	14.15	16.20
34 x 4	23.60	27.10
36 x 4½	33.35	39.20
37 x 5	38.85	48.90

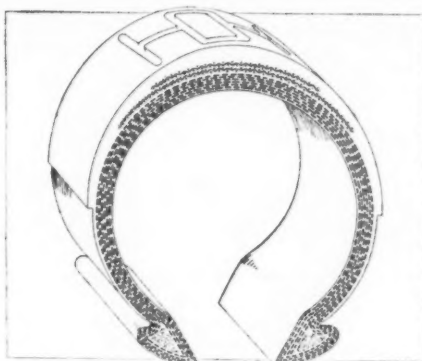
The accompanying illustration gives an idea of the non-skid tread.—Combination Rubber Mfg. Co., Bloomfield, N. J.

New York Headlight Controller

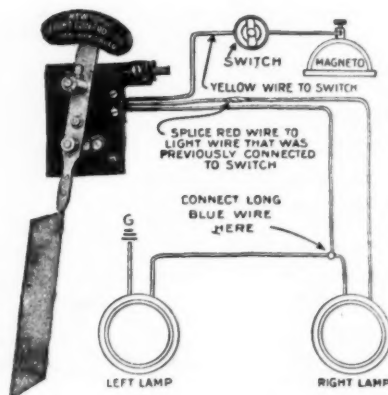
With this advice the makers claim a Ford magneto can be made to deliver a brilliant strong light even when operating at the lowest speeds at which the car can run. The most novel feature of the device consists in the principle of utilizing the entire electrical output of the Ford magneto at all speeds below approximately 15 m.p.h. for the one headlight located on the left side of the car. Above this speed the two lights come into use, and at still greater speeds a resistance is automatically thrown into the circuits to prevent the lamp from becoming burned out. Every operation of the device is automatic, the driver having nothing to do with the system after it is once installed. The device depends for its operation upon the draught of air created by the fan, the instrument being placed about 8 in. to the rear of the fan, where it is secured to the top of the cylinder by means of one of the cylinder bolts. An arm which is counterweighted carries on one end an aluminum disk, which is in line with the left half of the fan. The air from the fan causes this disk to move away from it in direct pro-



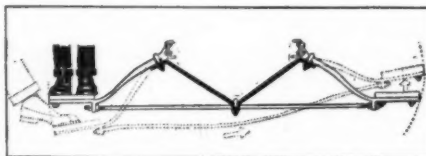
Bosch lighting and ignition system for small cars. Note horizontal magnet



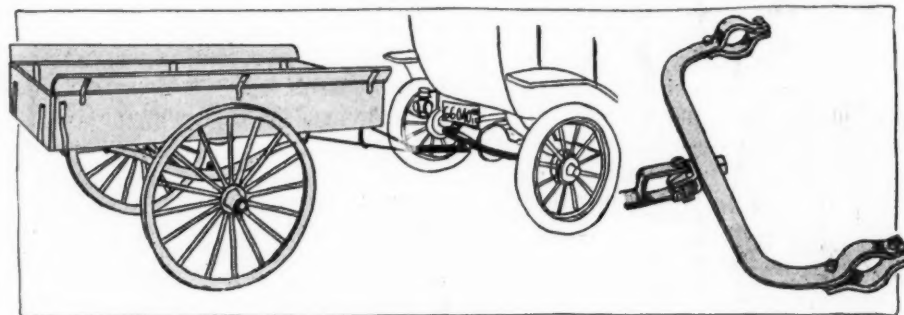
Combination Rubber Mfg. Co.'s depressed non-skid tread



New York headlight controller for Fords



Casey running board brace for Ford cars



Left—Harper trailer, showing method of attaching to the rear of a Ford car. Right—Harper trailer universal joint type connection

portion to the speed at which the motor is running. An adjustable spiral spring tends always to operate the arm and disk in the opposite direction. The arm carries a contact which forms a sliding connection or contact on three similar contacts secured in the solid metal base.

When the engine is turning at speeds below 15 m.p.h. the arm establishes connections to the one left lamp. As the speed increases to a point where the magneto is able to supply the two lamps with current, the air draft from the fan is sufficient to move the arm to the second contact, which cuts in two lights. A greater speed causes the device to throw in a resistance coil which prevents their being burned out. The device is simply installed.—New York Coil Co., Inc., New York City.

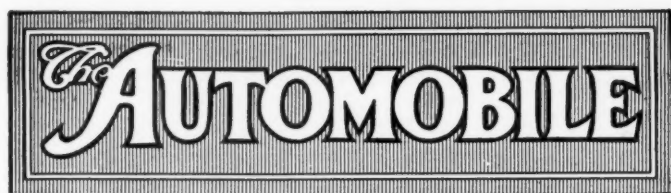
Harper Trailer

These trailers are built as No. 10, which has Timken roller-bearing axles for speeds up to 35 m.p.h., and No. 12 with plain spindles for speeds up to 20 m.p.h. Both models are 8 by 40 by 72 in., inside measurement, either with or without flareboards. Sills are ash and panels yellow poplar. Wheels are 34 by 1½ or 1¼ in., either steel or solid rubber tires being fitted. Axles are 1½ in., with a carrying capacity of 1000 lb., or 1¼ in., having a capacity of 1500 lb. Standard tread is 56 in. With steel tires the trailer weighs about 280 lb. and with rubber tires about 295 lb. Crating for shipment adds 100 lb. The Harper patent universal joint connection, as illustrated, is used. Standard finish is black with blue striping with lettering at extra cost, if desired. Prices are as follows:

	Steel Tires		Rubber Tires	
Trailer	1½-in.	1¼-in.	1½-in.	1¼-in.
No. 10.....	\$60	\$62	\$65	\$68
No. 12.....	52	53	57	68

Casey Running-Board Brace

By the use of the Casey brace the running boards of a Ford are prevented from sagging when heavy weight is placed on them. The brace forms a triangular suspension and prevents buckling of the cross rod that runs from one board to the other. It is easily applied without drilling or fitting and without special tools. The brace sells for \$2.—Kansas City Automobile Supply Co., Kansas City, Mo.



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The Price of Steel and of Automobiles

IT is an almost universal law of commerce that the price of an article bear some relation to the demand for it. If the demand is small the price is high, because it is troublesome to make a thing not often desired. If the demand is steady, competition enters the field and prices come down, reaching a level fair to the manufacturer and to the ultimate buyer. If, after a period of steady and well balanced supply and demand, the latter should suddenly increase an hundredfold, then the price goes up, because the more ardent purchaser willingly offers a premium for the goods he needs.

So to-day is the case of the steel market. Steel, the staple product of America, is in ever-increasing demand, but the curve of demand is more like a flight of steps, or the approach to some great mountain peak, than it is like a well-graded hill. When the country is prosperous, when everyone has money to spend, then the demand for steel is high. When trade is bad, when money is short, then the demand for steel falls off.

At the present moment we see the demand for steel at a fury never before attained, and for *two* reasons. One reason is that Europe's need has caused an immense increase in the exportation of steel products, and the other, *which is the greater*

of the two, is that the prosperity begotten of that exportation calls for more and more steel to cope with the domestic demand begotten of the prosperity of the U. S. A.

Look on one hand and we see great manufacturing communities earning more money than ever before in history. These same communities, prosperous and with overflowing bank balances, turn naturally to the automobile as a most desirable thing to buy with a portion of their surplus and unexpected wealth.

Look on the other hand and we see the automobile manufacturer distressed that he has to pay more for steel in order to supply the demand on him created by the prosperity of those other persons who have gained their ability to buy automobiles by reason of the prices which other people are willing to pay for steel in other forms.

Examine the position of the employees of a shell factory. They are prosperous because of the foreign demand for the product they are making. Being prosperous they desire to possess automobiles, and the automobile manufacturer finds that the prosperity which creates the demand in this way also has increased the price he has to pay for steel.

Worth Is Not Price

A diamond has no market price; it is worth merely what people can be found to pay for it. In prosperous times diamonds are worth far more than in times of want. In a general trade slump the Kohinoor itself might be worth but a tenth of what it would fetch if put up to auction in times such as those we are enjoying to-day.

Prosperity is a good thing; none but a misanthrope can debate the question, but like most good things it has its price. A manufacturing country desires exports, and more exports, for exports represent direct money earned by the country as a unit, and if a country as a unit is exporting in enormous excess over its imports it is piling up wealth, so long as it obtains a proper price for the goods sent overseas.

America to-day is drawing from Europe incredible sums of money. The impoverishment of Europe is the wealth of America, so if American automobiles are to cost a trifle more the balance still remains well upon the credit side of the ledger. We are all making *much* more money either directly or indirectly, so it is rational to pay a *little* more money for our automobiles, since our very prosperity is the reason for that slight increase in price.

In the past six months we have seen automobile manufacturers decreasing prices in order to tempt a larger market and to be able to increase their outputs. To-day it is clear that the outputs would have been increased just the same without the drop in prices. Obviously then, the wise thing to do is to return all the way or part of the way to the old prices, till such a time as the price of steel decreases. Give the public the credit for a reasonable intelligence and an ability to understand a state of affairs that is making them, collectively, prosperous beyond all dreams.

Kansas City Show Is Largest on Record—Huge Crowds at Opening

Show Claimed to Have Larger Floor Area than Chicago—Exhibits Valued at \$3,000,000—Tractor Show, Held Simultaneously, Also Attracts Many Visitors

KANSAS CITY, Mo., Feb. 8—The annual motor show of the Kansas City Motor Car Dealers' Association opened to-day in the J. I. Case Building, Twenty-first Street and Broadway, with ninety-six motor car exhibitors and fifty-six accessory dealers having space in the four floors given over to the showing. Officers of the dealer association point out that the Kansas City show has twelve more car exhibitors than the New York exhibition and, using 140,000 sq. ft. of floor space, exceeds in size the recent Chicago show.

The show is the largest in history, with 192 vehicles. There are thirty-two commercial vehicles and fifteen electrics. Many dealers have already arrived from western Kansas, Oklahoma and northern Texas. Many retail sales were reported to-day in spite of cold weather, and much larger attendance than last year is looked for. Buying has been better last month than a year ago. Closed car business has increased heavily. A very large crowd appeared to-night, all four floors of Case Building being crowded.

"Kansas City for the last three years has been the largest motor car distributing center in the United States," E. E. Peake, secretary of the association, explained. "This, however, is the first year the show has been the largest in America."

The Kansas City Tractor Club also opened its first annual show, in a big tent on the Union Station Plaza, to-day. It has twenty-six tractor exhibits and forty-nine accessory makers, using 40,000 sq. ft. of space, and opened with good crowds.

The two shows this week, it is predicted, will bring from 50,000 to 60,000 visitors to Kansas City from western Missouri, Kansas, Oklahoma, southern Nebraska, northwestern Arkansas, and northern Texas, which is, roughly, the district served by the distributing agencies here. More prosperous this year than for several seasons, dealers expect heavy sales throughout the territory and already the hotels are crowded by the incoming visitors.

Convention Hall here has housed the show every previous year. But despite the fact that it was large enough to hold the biggest crowd that heard President Wilson on his recent swing through the Central West, it is too small for the motor exhibit. The Case Building, an eight-story warehouse structure near the new Union Station, was obtained this year, as it offered more space

and probably will be retained for future shows.

The exhibits at the show are given a valuation of \$3,000,000—the Southwest this year will pay attention to nothing that does not speak in millions.

The first floor in decorations is strictly American, the second modeled after the Monte Carlo gardens, the third has been named the Casino de Vichy, and the fourth floor has been converted into a Japanese garden.

Jordan Motor Car Co. Takes Detroit Office

KENOSHA, WIS., Feb. 8—E. S. Jordan, president of the new Jordan Motor Car Co., announced to-day that an engineering office has been established in the Goldberg Building, Detroit, where preliminary design work of the new car is being carried out. The company has not decided on a factory location as yet.

To Build Entz Transmission in Fort Wayne Plant

NEW YORK CITY, Feb. 8—The Fort Wayne plant of the General Electric Co. is being tooled up to manufacture the Entz transmission in large quantities. The Entz Motor Patents Corp., which was organized primarily to own the patents known as the Entz patents, covering an electric transmission unit, has also acquired other patents owned previously by the General Electric Co., which has acquired a substantial interest in the Entz corporation.

Studebaker to Redeem 5 per Cent Serial Gold Notes

SOUTH BEND, IND., Feb. 8—The Studebaker Corp. has given notice that it will redeem on March 1, 1916, all of its outstanding 5 per cent serial gold notes by the payment of 101½ per cent of the principal thereof, together with the accrued interest thereon. After March 1, 1916, all interest on these notes will cease.

Kelly-Springfield Tire Has \$1,706,744 Balance for Dividends

NEW YORK CITY, Feb. 8—The Kelly-Springfield Tire Co. reports for 1915 a balance for dividends of \$1,706,744, equal to 29 2/3 per cent on the \$4,834,000 common stock, against 23 1/5 per cent on \$4,000,000 the previous year. The gross profits were \$2,880,080 as against \$2,203,761 in 1914.

The balance sheet, as of Dec. 31 last, shows cash on hand of \$705,051, against \$380,415 in the corresponding period a year ago; total current assets of \$3,581,605, against \$2,717,405 a year ago and total assets and liabilities of \$11,607,761, contrasted with \$10,525,153 on Dec. 31, 1914.

The report for the year ended Dec. 31, 1915, is as follows:

	1915	1914
Gross profit	\$2,880,080	\$2,203,761
Oper. expenses, etc.	1,195,874	1,014,016
Net income	\$1,684,206	\$1,189,745
Other income	22,538	16,476
Balance for dividends ..	\$1,706,744	\$1,215,144
Dividend, sink. funds, etc.	727,664	373,451
Surplus	\$979,080	\$841,693
Previous surplus adjusted.	1,147,659	292,946
Total surplus	\$2,126,739	\$1,134,639

Studebaker Reduces Hours

SOUTH BEND, IND., Feb. 8—Effective March 1, the regular working hours in the local plants of the Studebaker Corp. will be reduced from 55 to 50 hr. a week, divided into 9 hr. a day for 5 days, and 5 hr. on Saturday. In order to adjust wages to the new working hours all piece rates and hour rates will be increased 10 per cent.

This action affects about 4000 men and will cost the corporation about \$360,000 per annum. The present pay roll is about \$300,000 a month.

Princess Motor Car Co. Capitalized at \$1,000,000

WILMINGTON, DEL., Feb. 7—The Princess Motor Car Co. of Detroit, Mich., has been incorporated under the laws of Delaware, with a capital of \$1,000,000, to manufacture, sell and deal in and with motor cars and all parts. The incorporators are O. C. White of Detroit, and Isaac N. White and Frank W. Barbee, both of Pittsburgh, Pa.

Hathaway Pres. Stanley Belting Corp.

CHICAGO, ILL., Feb. 8—C. E. Hathaway has resigned as Chicago manager of J. H. Williams & Co., maker of drop forgings, and has been elected president of the Stanley Belting Corp., Dundee, Scotland, with headquarters in Chicago.

A. L. Whittemore, also formerly with the Williams company as assistant to Mr. Hathaway, has been elected vice-president. John Laurence was re-elected secretary. A. G. List was elected treasurer.

Rankin Heads Mahin Advertising Co.

CHICAGO, ILL., Feb. 8—J. L. Mahin, founder of the Mahin Advertising Co., has sold his interests to W. H. Rankin, and retires at once from the presidency of the organization. Mr. Rankin has been vice-president of the company during the past seven years.

S. A. E. Sections Expect Good Meetings

Detroit and Indiana Sections Anticipate Large Attendance at February Gatherings

NEW YORK CITY, Feb. 7—On Feb. 16 "The Trend of Automobile Design" will be the paper read before the Detroit section of the S. A. E. by A. Ludlow Clayden, Engineering editor THE AUTOMOBILE, and on Feb. 25 F. A. Cornell will read a paper entitled "Anticipating Complaints" before the Indiana section.

The Detroit paper consists of a candid criticism of the chassis and cars seen at the National shows, and contains some suggestions concerning lines along which automobile engineers will have to work in the future. Particular stress is laid upon the untried possibilities of the heavy oil engine for automobile work.

Mr. Cornell's paper deals with a quite different subject, being a dissertation upon how best the service department of a factory can anticipate troubles and assist the car owner by a proper system which will insure that the troubles be the minimum, and the attention of service men throughout is asked for.

Auto Shipping Breaks All Records

NEW YORK CITY, Feb. 7—Although affected by the famine in freight cars, the automobile industry in January broke all records for the shipment of automobiles, the official figures supplied by the Traffic Department of the National Automobile Chamber of Commerce, showing 18,054 carloads for last month, as against 8369 carloads in January, 1915, an increase of 115 per cent.

This unusual increase during the winter months is looked upon as one of the most favorable signs of a big spring trade. Moreover, the dealers say that with convertible tops and the constant need of the service which automobiles supply, the marketing of motor cars is now conducted on almost as heavy a scale in winter as in summer.

Chalmers Sells Its Boston Branch

BOSTON, MASS., Feb. 5—One of the biggest motor transactions in New England was completed this week when the Chalmers Motor Co. of Massachusetts was purchased by O. L. Halsey. The latter had been handling Packard cars at Kansas City for six years, but as he was formerly a Bostonian he wanted to return to the Hub. So he sold out there. He is a brother-in-law of Alvan T. Fuller, who has the Packard at Boston, Portland, Providence and Manchester. Harry Pyke, manager of the Chalmers

branch, has gone to Detroit to confer with the factory officials about a position. F. E. Sumner, who was wholesale manager for the Saxon Motor Co., has joined the sales force of the new company, and F. P. Allen, retains his place as manager of the organization, a position he held with the Chalmers branch.

Alliance Motor Elects Officers

ALLIANCE, OHIO, Feb. 7—The annual meeting of the stockholders of the Alliance Motor Car Co. resulted in the election of C. C. Mummert, president; C. G. Kline, vice-president; S. L. Geiger, secretary; J. O. Ellis, treasurer and O. R. Mummert, general manager.

Legalizes Sunday Work in Bay State

BOSTON, MASS., Feb. 5—The Massachusetts Legislature this week passed the bill to allow motor dealers and garage men to sell supplies like oil, gasoline, tires, etc., and to do necessary repair work on Sundays. Under the law as it stood it was illegal to make any repairs or sales on Sundays, and a Springfield judge convicted a garage man for doing it, warning him and others in that city to refuse to sell anything in future.

Cars in Gallery at Boston Show

BOSTON, MASS., Feb. 5—The problem of how to house all the applicants for space at the Boston Automobile Show is not yet solved, although a partial plan has been worked out. For the first time there will be cars in the balcony this year. A few years ago a couple of dealers exhibited a few cars upstairs, but not very many. This year seven exhibitors have so far been given space there. It is more advantageous than going into another building, for the balcony circles the main hall so that the cars may be seen.

At the present time just 107 exhibitors of passenger cars and trucks have been allotted space, and there are applications on file for at least 40 more. There will be 74 different makes of passenger cars and 33 makes of trucks so that all told more than 400 machines will be on view.

U-W Pull-Out Line Sells for \$3.50

NEW YORK CITY, Feb. 7—In a description of the U-W Pull-Out line manufactured by the Upson-Walton Co., Cleveland, Ohio, in THE AUTOMOBILE for Jan. 27, the price was given as \$2. This should have been \$3.50.

French Import Tractors

MANKATO, MINN., Feb. 8—The Mayer Bros. Co. has contracted to deliver in a 5-year period 186 of its light traction engines to a Paris automobile importing firm. The first shipment is being put together and is to leave soon. Announcement was made to the stockholders at their annual meeting Jan. 26.

261,800 Miles Wins Hyatt Contest

Winner Gets \$500—Fifteen Other Prizes—Average Mileage 156,814 Per Car

DETROIT, MICH., Feb. 4—F. E. Slason, Plainville, Kans., has been awarded the first prize, \$500, by the Hyatt Roller Bearing Co. in its mileage contest among car owners to find the one whose automobile has traveled the greatest distance with its original set of Hyatt roller bearings.

The winner had covered 261,800 in a 1909 Buick up to October, 1915, at which time the car was turned over to the judges of the contest.

Besides Mr. Slason, fifteen other contestants have been awarded prizes, and the winning cars covered a total distance of 2,512,435 miles, which is equal to more than 100 times around the world. The average mileage of the sixteen contestants was 156,814 miles or more than six times around the world.

Of the sixteen winning cars, six are Mitchells, four are Fords, two are Buicks, the other four being a Logan, a Maytag, a Hudson and a Flanders. The oldest car was the Logan, which was a 1916 model. One of the Buicks and one of the Fords were of the year 1908. The winning Buick, three Mitchells, the Flanders and one Ford were 1909 models. Three Mitchells, the Hudson and the Maytag were made in 1910, while two Fords were of the 1911 production.

The regulations of the contest which closed Nov. 1, 1915, provided that any car is eligible provided it had its original equipment of Hyatt roller bearings. The winner was to be the one whose car showed the greatest mileage, and he was to receive \$500. The next five prizes were respectively \$200, \$100, \$50, \$30 and \$20, the next ten to receive \$10 each.

THE WINNERS

1. F. E. Slason, Plainville, Kans.—1909-Buick; 261,800 miles.
2. James Lewis, Shelton, Conn.—1909-Mitchell; 218,734 miles.
3. J. W. Norman, Paint Rock, Tex.—1909-Mitchell; 183,837 miles.
4. Sam Deck, Darlington, Ind.—1910-Mitchell; 175,875 miles.
5. J. D. Albright, Bowie, Tex.—1911-Ford; 172,683 miles.
6. Earl G. Druding, Ellsworth, Wis.—1909-Ford; 171,418 miles.
7. S. T. & E. R. R., Stockton, Cal.—1909-Mitchell; 160,100 miles.
8. Jacob Stark, Chicago, Ill.—1906-Logan; 148,150 miles.
9. J. J. Moore, Philadelphia, Pa.—1911-Ford; 147,751 miles.
10. John Fraser, Jr., Milwaukee, Wis.—1908-Buick; 139,523 miles.
11. Geo. R. Mason, Des Moines, Ia.—1910-Maytag; 135,000 miles.
12. J. M. Bertolet, M. D., Reading, Pa.—1910-Mitchell; 127,681 miles.
13. Jas. W. Hines, Minneapolis, Minn.—1910-Hudson; 120,256 miles.
14. Linus Kiene—1910-Mitchell; 120,000 miles.
15. L. N. Burnett, Dallas, Tex.—1909-Flanders; 116,557 miles.
16. F. I. Wiltse, Oneonta, N. Y.—1908-Ford; 113,061 miles.

Carter Carbureter Forms Sales Dept.

H. C. Weed to Be Vice-President of Carter Co.—Will Direct Sales

NEW YORK CITY, Feb. 7—The Carter Carbureter Co. of St. Louis, Mo., has cancelled the selling arrangements which it has had with the H. W. Johns-Manville Co. of New York for two years past and has arranged to market its products this year through its own sales department.

The H. W. Johns-Manville Co. will continue to sell Carter carbureters and Carter gravity tanks, but will no longer handle the sale of these commodities to automobile manufacturers.

H. C. Weed, general manager of the carbureter department of the H. W. Johns-Manville Co. will continue to direct the sales policy of the Carter company, in the capacity of vice-president and general manager with offices at the factory in St. Louis.

The company will make a specialty of service, with factory experts located in every large city in the country under the direct supervision of the service department at the factory. Sales to the trade will be handled entirely through jobbers and general distributors, the policy of the company being to absolutely restrict the sale of its products to the jobbing trade. R. V. Wright, formerly connected with the H. W. Johns-Manville Co. has been made eastern district sales manager, with headquarters at Philadelphia. J. K. Dalton, formerly of the Stromberg Motor Devices Co., will have charge of the Middle West territory, with headquarters at Indianapolis. G. M. Bicknell, assistant engineer of the company, will have permanent residence at Detroit, and will take care of Carter interests there.

Bossert to Enlarge

UTICA, N. Y., Feb. 5—The Bossert Co., manufacturer of automobile pressed steel metal parts, has arranged for the construction of an additional two-story, 180 by 58-ft., factory building. Business in 1915 was better than in any previous year. Orders now on the books are far ahead of the record of 1915 and make the extension of the plant a necessity.

Salem Rubber Co. to Make Tires

SALEM, PA., Feb. 7—The Salem Rubber Co., a concern with an authorized capital of \$600,000, will shortly start operations in Salem, Lawrence county, in the plant formerly occupied by the American Case & Register Co. The new company will have a working force of 150 men and a daily output of 250 au-

tomobile tires. A. E. Gordon, of New Castle, will be the general manager of the new plant. C. E. Meyer, of Pittsburgh, is financially interested in the new plant.

The new concern will manufacture a standard guaranteed tire with "Salem" as its trademark. Mr. Gordon will bring with him to Salem an organization of trained men. The chief financial support for the new enterprise will be secured in New Castle, Canton, Youngstown and Pittsburgh.

Rutherford Succeeds Raymond as Goodrich Sales Manager

NEW YORK CITY, Feb. 7—W. O. Rutherford has succeeded H. E. Raymond as sales manager of the B. F. Goodrich Co., Akron, Ohio. Mr. Raymond, who is second vice-president of the company, will continue actively as vice-president, exercising general supervision over sales and advertising policies. Mr. Rutherford has been connected with that company for seventeen years.

Lakeside Foundry 100% Stock Dividend

DETROIT, MICH., Feb. 7—The stockholders of the Lakeside Foundry Co. will receive a 100 per cent stock dividend to be paid from accumulated surplus. The capital stock of the company will also be increased from \$40,000 to \$120,000.

Hoffman, Sun Engineer, Resigns

ELKHART, IND., Feb. 5—R. C. Hoffman, engineer and designer for the Sun Motor Car Co., Elkhart, Ind., has resigned to devote his time to developing a semi-Diesel type of tractor motor.

Republic Output 600 Monthly

ALMA, MICH., Feb. 5—More trucks will be made and shipped during February by the Republic Motor Truck Co., according to general manager F. W. Ruggles, than during the first eighteen months the company was in business. The production schedule has been arranged on a basis of at least twenty-five trucks per working day and at least 600 for the month. Materials for an output of more than 800 trucks were on hand at the beginning of the month, it is said.

New Truck Co. for Bay City

BAY CITY, MICH., Feb. 3—A two-ton truck designed by Howard P. Woodworth, formerly with the Republic Motor Truck Co., Alma, Mich., will be made here by a new truck company now being organized. This was decided at a meeting of business men at the Board of Commerce. Ten men agreed to furnish capital and James R. Tanner was appointed to look after all the necessary preliminary work.

Crude Oil Price No Explanation

Secretary Lane Puts Onus on Standard Oil for Gasoline Price Increase

CHICAGO, ILL., Feb. 7—Word has reached Chicago that Secretary of the Interior Lane has reported to the Senate that the Standard Oil Co. is to blame for the existing high price of gasoline. While the secretary admits that the production of gasoline has not kept pace with demand, he says there is no relation between the price charged by the oil companies for gasoline and the price they paid the producers for the crude oil. He further declared that through their system of refineries and pipe lines, and especially because of their powerful financial backing, the Standard Oil companies are able to profit both on a rising and falling crude oil market.

The secretary's report was in response to a resolution passed by the Senate several weeks ago directing him to institute an inquiry. He submitted figures showing that production was 41,600,000 barrels in 1915, and that consumption in 1914 was 25 per cent more than 1913 and in 1915, 35 per cent more than in 1914. Exports of gasoline, he said, increased 500,000 barrels in 1914 over 1913 and 1,500,000 barrels in 1915 over the preceding year. Crude oil cost the oil companies less in 1915 than in 1914, he said. In conclusion, the secretary said that the increase in the price of crude oil between January, 1915, and the present was from \$1.45 a barrel on the first date to \$2.25 at present, gasoline rising in the meantime from 12 to 31 cents.

Protests are being made against the skyrocketing prices in several States, the latest to be heard coming from Missouri, where every car owner in the State is being urged by the independent oil dealers to use their influence with their Congressmen toward defeating the proposed bill for taxing gasoline.

Cram Goes to Overland

DETROIT, MICH., Feb. 8—J. M. Cram, for fourteen years with the Mitchell-Lewis Co., and who was vice-president and sales manager of the L. P. C. Motor Co., Racine, Wis., has joined the sales department of Willys-Overland.

Overland Makes Shipping Record

TOLEDO, OHIO, Feb. 8—The Willys-Overland Co. on Jan. 31 last established a new shipping record when 722 automobiles were sent out from its plant that day. During January, 1915, the total number of cars that left the factory amounted to 4613, as compared with 12,393 for the same month this year.

A year ago the daily shipments from the Overland factory averaged 150 cars, or less than one-fourth of its present output. The manufacturing facilities have been increased in one year so that it is now possible to build 1000 cars every 24 hr. The present floor space available for manufacturing purposes is 103 acres. This is fourteen times the size of the original plant when taken over by Mr. Willys eight years ago.

Sutcliffe Edison Advertising Manager

ORANGE, N. J., Feb. 7—Paul Sutcliffe has been appointed advertising manager of the Edison Storage Battery Co., Orange, N. J. Mr. Sutcliffe got his earlier advertising and selling experience in California. On coming East in 1912 he joined the Edison interests, but resigned at the end of a year to become secretary of the W. S. Hill Advertising Co., Pittsburgh, Pa. He has been in the advertising department of the Edison Storage Battery Co. for the past year.

Galion Co. to Make Tractor Plow

GALION, OHIO, Feb. 5—The Motor Driven Implement Co. of Galion, Ohio, was incorporated at Columbus recently, with \$50,000 capital. The incorporators are E. P. Rayle, Dr. E. D. Helfrich, B. E. Place, S. A. Wheatcraft and H. L. Bodley. The principal output of the company has been in process of perfection for nearly two years, and is now ready for the market. It is a light draft tractor plow, with the plow built into the tractor, the whole to be built so as to sell at a reasonable price. The plow has been tested in all kinds of soil and under all sorts of conditions and is said to have stood the test in every instance.

New Capital for American Tire & Rubber Co.

AKRON, OHIO, Feb. 6—Stockholders and directors of the American Tire & Rubber Co. voted to reorganize the company with capital to be furnished by the Mauger-French Co. of Massillon, an investment brokerage firm. Contracts for the transfer of the stock, share for share, were settled and the deal was practically completed.

The American Tire & Rubber Co. has been completely overhauled during the past few weeks by H. A. Croxton and associates, a firm of engineers, hired by the American Tire & Rubber Co., to place its property on a basis so it could be considered by brokers for reorganization.

INDIANAPOLIS, IND., Feb. 4—The Premier Motor Corp. of Del. has announced that \$1,710,000 of its total capital of \$2,500,000, is to be represented in Indiana.

Great Northwest Wants More Cars

100,000 Automobiles Is Estimated Requirement of Farmers in Territory

MINNEAPOLIS, MINN., Feb. 6—More than 100,000 farmers in Minnesota are open to buy automobiles. Of the entire registration in the State on Nov. 1, 1915, more than 54 per cent are now owned by farmers. A study of nineteen towns from which cars are registered shows that the most cars are owned in towns supported chiefly by farming or dairying.

For six seasons the coming census of automobiles has been awaited with interest, each season by manufacturers and distributors as a basis for estimate of future sales. This annual digest has been issued for 1915 by the *Farmer*, St. Paul. It places the total registration on going to press at 93,111.

Of the total, when the figures were made, cars registered from Minneapolis, St. Paul and Duluth were altogether 20,541, based on a combined population of 722,871, or thirty-five to the car. Outside these big cities the estimated population of the towns is 640,177, and the registration of cars in the State outside the tri-cities is 64,852. On the basis of thirty-five to the car the actual town ownership of cars is 18,290, leaving 46,562 in the hands of farmers.

In the State there are 155,000 farms with an average wealth of more than \$9,000. With the expectation that absence of cars on farms will soon be a rarity, the opportunity to sell automobiles is more than 100,000. Sales increased, according to the table, 33 per cent in 1915.

A number of other details concerning the Northwest territory are given on pages 267, 268 and 269. The tables below, perhaps speak more loudly still.

Firestone Rim Business Expands

AKRON, OHIO, Feb. 7—The rim factory of the Firestone Tire & Rubber Co. now occupies more floor space than the whole company did in 1910, according to figures just given out, on expansion of the business at the plant.

The demand for rims for the coming season will be for nearly 1,000,000, and this means a large addition to the present rim plant, the company says. The tire plant has been increased to give a daily output of 12,500 tires a day this year instead of 7500, last year's output. The biggest business in the history of the company is anticipated in 1916.

Firestone Heads Rubber Club

NEW YORK CITY, Feb. 3—The Rubber Club of America has elected the following officers: President, H. S. Firestone, Firestone Tire & Rubber Co.; first vice-president, Van H. Cartmell, Kelly-Springfield Tire Co.; second vice-president, H. L. Hotchkiss, United States Rubber Co.; and secretary, H. S. Vorhis.

CROP VALUES IN MINNESOTA, MONTANA AND THE DAKOTAS

	1915	1914	1915	1914
	MINN ESOTA		SOUTH DAKOTA	
Wheat.....	\$66,078,000	\$43,834,000	\$54,835,000	\$29,672,000
Corn.....	38,502,000	47,320,000	46,182,000	39,000,000
Flaxseed.....	5,544,000	3,750,000	2,756,000	2,952,000
Oats.....	43,000,000	34,048,000	20,280,000	16,738,000
Rye.....	4,738,000	4,668,000	1,334,000	796,000
Potatoes.....	11,782,000	9,850,000	2,737,000	2,665,000
Hay.....	20,538,000	20,093,000	6,466,000	4,845,000
Barley.....	20,176,000	16,798,000	11,040,000	9,775,000
	NORTH DAKOTA		MONTANA	
Wheat.....	\$132,214,000	\$82,408,000	\$26,384,000	\$16,704,000
Flaxseed.....	11,631,000	8,924,000	1,352,000	1,064,000
Corn.....	6,561,000	8,120,000	3,213,000	3,072,000
Oats.....	26,460,000	24,014,000	9,984,000	7,234,000
Rye.....	2,133,000	1,882,000	146,000	147,000
Potatoes.....	2,958,000	3,205,000	3,022,000	3,315,000
Hay.....	3,762,000	3,016,000	11,625,000	15,225,000
Barley.....	19,712,000	12,724,000	1,306,000	1,132,000

TOTAL 1915 CROP VALUES OF NORTHWEST, \$589,429,000

TOTAL CROP VALUES OF EIGHT CROPS 1915 FOR ALL U. S. A.

	Minn.	N. D.	S. D.	Mont.	1915	1914
Corn.....	\$38,502,000	\$6,566,000	\$46,182,000	\$1,352,000	\$930,000,000	\$878,680,000
Spring wheat.....	65,025,000	132,214,000	52,632,000	12,168,000	1,755,859,000	1,722,070,000
Flaxseed.....	5,544,000	11,631,000	2,756,000	3,213,000	24,080,000	19,540,000
Oats.....	43,000,000	26,460,000	20,280,000	9,984,000	555,569,000	499,431,000
Rye.....	4,738,000	2,133,000	1,334,000	146,000	41,295,000	37,018,000
Potatoes.....	11,782,000	2,952,000	2,737,000	3,022,000	221,104,000	198,609,000
Hay.....	20,538,000	3,762,000	6,466,000	11,625,000	912,320,000	779,068,000
Barley.....	20,176,000	19,712,000	11,040,000	1,306,000	122,499,000	105,903,000
Winter wheat.....	1,053,000	0,000,000	2,203,000	14,216,000	.....	.....
	\$210,368,000	\$205,430,000	\$145,630,000	\$57,032,000	\$4,662,926,000	\$4,235,319,000

Vanderbilt Cup Not for Speedway

Refusal to Grant Race to Corona May Reduce New York's Chances

CHICAGO, Feb. 7—Neither the grand prize nor the Vanderbilt cup will be hung up for speedway competition. This is the announcement brought west from New York by G. R. Bentel, manager of the Los Angeles speedway and representative of the Corona Road Racing Assn., who traveled across the continent in hopes of securing the grand prize for the Corona contest, which has been classified as a boulevard or semi-speedway race by the contest board of the A. A. A.

As a consequence, Bentel's long trip was futile as the Motor Cups Holdings Co., which controls both the grand prize and the Vanderbilt cup, refused to grant Corona's request for a grand prize race sanction. The ruling in regard to the historic trophies may alter plans of the New York speedway directors to hold the Vanderbilt cup classic on the Sheepshead Bay course this season.

Corona will run a grand prize race, however, which will be known as the Corona grand prize. In addition to the \$12,000 in prize money that has been voted, the Flagler trophy will go to the winner. The contest will be a free-for-all and the distance the same as in 1914, 301 miles. The purse will be split as follows: First, \$5,000; second, \$3,000; third, \$2,000; fourth, \$1,000; fifth, \$700 and sixth, \$300.

Upon his arrival in Chicago yesterday, Bentel received a telegram from Corona acquainting him of the fact that the date of the Corona race had been changed from March 17 to April 8 so that the Corona event will not conflict with the series of meets to be held on the Los Angeles speedway, all of which will be run prior to April 1. The Los Angeles promoters already have received a sanction for a February 22 race and have reserved two additional dates in March. Each of the three events probably will be 100 miles in distance and for \$5,000 in purses.

Indianapolis Seat Prices Lowered

INDIANAPOLIS, IND., Feb. 7—A general reduction in admission and seat prices has been made for the coming Memorial 500-mile race on the Indianapolis Speedway on May 30. This year the admission prices have been changed. Instead of the general admission being \$2 at every entrance, this price will prevail only at the main gate. Entrance fee at the eastern entrance has been cut to \$1. Prices for seats after one is in the grounds have been lowered. The list

follows: Box seats in the paddock stand and Stand E formerly sold for \$7 and \$10. This year the prices for the same seats are \$5 and \$7. Box seats in Grand Stands A and B remain the same, \$7 and \$10. Reserved individual seats in these stands are \$2.50, the same as last year. Reserved seats in Grand Stand C sold for \$2 last year. This year they will be priced at \$1. All other seats will call for the expenditure of \$1.

Maintenance of Resale Prices Favorable to National Chamber Directors

WASHINGTON, D. C., Feb. 8—The board of directors of the Chamber of Commerce of the United States have voted that the report of a special committee of the National Chamber on the maintenance of resale prices shall be submitted to referendum. The committee had reported to the board that it was not able to present a unanimous report to the board.

A majority recommendation favoring legislation permitting price maintenance was signed by seven of the ten members, two of them, however, modifying their assent by the filing of a supplementary report. With the majority report came the comment that a National Chamber committee had rendered a report last February favorable to the principles of price maintenance and the majority members saw no reason in any way to modify the conclusions arrived at and given to the Chamber at that time.

"But on the contrary," the comment continues, "after additional exhaustive investigation by consulting a large number of organizations, composed of many thousands of members in all branches of trade and industry, as well as many individual producers, distributors and consumers, and after having collected evidence from a great many sources, we repeat the language of the committee's previous resolutions of February, 1915, as our report and conclusions, viz.:

"Your committee is convinced that legislation permitting the maintenance of resale prices, under proper restrictions on identified merchandise, for voluntary purchase, made and sold under competitive conditions, would be to the best interest of the producer, the distributor and of the purchasing public, or consumer."

Saxons in Strong Demand

DETROIT, MICH., Feb. 5—During January the Saxon Motor Car Co. reports to have received orders for 6792 cars for immediate shipment, which is more than double the former biggest Saxon month, May, 1915, when 3318 orders were received. Shipments of cars in January was 120 per cent greater than in the first months of 1915.

Many Suggested Laws for Mass.

Fifty Bills Affecting Automobiles to Be Discussed in Next Few Weeks

BOSTON, MASS., Feb. 5—There are about fifty bills affecting motor vehicles in one way or another before the Massachusetts Legislature at present. Hearings began on the first of them last week, and it is expected that before the show opens in March they will have all been heard so that the dealers will not be worried about them. The Committee on Roads and Bridges will hear the greater number of them. This committee last year did its work better than any previous committee that ever handled motor legislation. Senator John Haigis is the Senate chairman and Harry Foster the House chairman. Those who have watched the career of Senator Haigis since he entered the Legislature a few years ago believe that he will some day be Governor, for he has a most intelligent grasp of matters, and he knows how to handle men and problems without friction.

Women Drivers Unrestricted

At the sessions Tuesday the first surprise came when the Safe Roads Assn. withdrew its bill that would prevent women driving cars of more than 30 hp. There were nearly 200 women motorists on hand to oppose it. Hearings were held on bills to increase the penalty for driving cars while drunk so that the prison terms would be longer and the Highway Commission suspensions would be greater. The motorists felt that they were willing to do anything possible to check such drivers, but it was argued that legislation would not accomplish very much.

The suggestion was made by James T. Sullivan of the Bay State A. A. that a conference of the motor bodies be held to try to arrange some plan to eliminate the drunken, reckless driver and one was planned to take place.

There is a measure to make the Highway Commission examine every applicant for a license. Another would make the owner responsible for any damage caused by a chauffeur if the owner were in the car at the time. There are bills requiring the Highway Commission to appoint 500 road monitors; another to have all cars use safety devices on front and rear; one to have all vehicles light lamps half an hour after sunset as motor vehicles are required to do now; a bill to make all transportation companies note the maker's and the motor number of every car they handle to trace stolen machines; others call for bond by owners before being allowed to drive, and

also for jitneys; for a State motor corps for the militia; for changing the registration fees; to prevent gasoline and kerosene being carried by the same wagon; to prevent contractors spreading tar over the entire width of the highway; to make the Highway Commission grant hearings before revoking a license; to allow motor cars to be operated on the island of Nantucket; to prevent motor cars being driven faster than street cars in cities and towns; to increase the fees on motor trucks; to establish a motor vehicle commission; to appoint motor patrolmen on the roads; to designate cross walks in cities and towns, etc.

There are other bills that have not yet been printed so that their contents are unknown. The motor representatives have been busy lining up to fight the adverse legislation and it is not expected that there will be any bills enacted that will seriously interfere with the motor industry.

Tractor Co. to Be Ford's Personal Property

DETROIT, MICH., Feb. 6.—To-day the stockholders of the Ford Motor Co. assigned and quit-claimed to Henry Ford all their rights and interests in the farm tractor business which the latter promoted last year. It means that this business will be conducted as a personal business of Henry Ford and his son Edsel B. Ford, or rather by the firm Henry Ford & Son, which was formed last year.

It was first announced in *THE AUTOMOBILE*, May 13, 1915, that the Ford Motor Co. will make farm tractors, and in its issue of June 24, the detailed plans for the tractor business were given, it being stated among other things, that Mr. Ford hoped to employ 20,000 men and expected to build 500,000 tractors a year.

At the plant in Dearborn, Mich., where the first tractors were made, it is said that quite a number of new tractors have recently been completed, but only for further testing and experimental purposes. It will probably be many months before the Ford tractor will be ready for the market. It is being further improved, but full particulars will not be given out now.

Kelsey Wheel Increases Stock 50 per Cent

DETROIT, MICH., Feb. 4.—The Kelsey Wheel Co., manufacturer of automobile wheels, rims, hubs, etc., has increased its capital stock from \$1,000,000 to \$1,500,000. Holders of the \$600,000 common stock of the original capital will receive a 50 per cent stock dividend, payable from accumulated surplus. Of the new capital \$600,000 will be retained in the treasury. The \$137,000 outstanding preferred stock will be retired through purchase.

Registrations Up 53% in Colorado

28,254 Automobiles in 1915
Compared with 18,433 in 1914
—Dealers Used 1000 Cars

DENVER, COL., Feb. 3.—Complete returns from the entire State just received and checked over by Secretary of State Ramer show 28,254 motor cars registered in Colorado for 1915, as against 18,433 for 1914. This is an increase of 9821 cars, or 53 per cent. Of this total number, 25,188 were for regular owners and 1001 for dealers, showing an increase of 324 over the number of dealers' licenses issued in 1914. Of the total registration, 8338 belonged to Denver. The total number of drivers' licenses was 3533, a substantial gain over the 2058 for 1914. The license revenue from motor cars, which goes to the State and county road funds, was \$107,664.70, a gain of \$37,282.70 over the \$70,382 received from 1914 fees. A total registration of at least 40,000 is predicted for 1916.

There were 1643 licenses reissued for cars bought during the year by owners who took out their license originally for another car, as compared with 482 for 1914, indicating a heavy increase in new car sales to persons already owning cars.

While a surprising share of this increased showing in registration numbers and revenue is believed to be due to the rigid inspection of licenses adopted by Secretary of State Ramer, the bulk of the showing is clearly due to an immense increase in sales during the last year. This inspection uncovered 2071 cases where owners had either failed to take any license whatever or had registered their cars at wrong horsepower and thus paid a lower fee than the law required; 176 non-registrations and improper registrations under the dealers' class; 917 chauffeurs, demonstrators and other persons driving cars belonging to others without required drivers' license; and 685 cases where owners had bought other cars, often of greater horsepower and requiring a higher fee than the car originally registered, and had merely transferred their tag to the new car without having the license reissued and properly recorded. These cases brought the State \$8,280 from the first class, \$840 from the second, \$917 from the third and \$1,731.50 from the reissues brought in by the inspectors, making a total of \$11,768.50 in fees dodged in different ways by car owners, dealers and drivers.

In a few cases, these evasions of the law took the bold and rather crude form of homemade license tags, which were detected through duplication of some

number issued to another person, and through defects in painting, etc. Several taxicab companies, real estate firms and other concerns having a large number of cars were also caught with dealers' licenses and compelled to take out regular owners' licenses as required by law and to pay whatever additional fees were involved.

Weston-Mott Honors Its President

FLINT, MICH., Feb. 3.—In a quiet way officials of the Weston-Mott Co., and of other concerns controlled by the General Motors Co., remembered to-day the twentieth anniversary of the connection of President Charles S. Mott with the first named concern. It was on Feb. 3, 1896, that the Weston-Mott Co. was organized, the interest of the Weston family having been bought out by the members of the Mott family. The business was originally started in 1884 in Jamesville, N. Y., wire wheels being made. In March, 1896, Mr. Mott was elected a director. In 1898 the business was moved into a new plant in Utica, N. Y. In June, 1906, a plant was built in Flint and the company moved there in 1907 and incorporated under the laws of Michigan. While the plant was in Utica, Mr. Mott was superintendent. From the time the new plant was started in Utica, Mr. Mott took an active part in the company, holding such positions as superintendent, general manager, vice-president and later president.

Detroit Steel Products to Enlarge

DETROIT, MICH., Feb. 5.—A large addition which will provide 60,000 sq. ft. more floor space will be erected at once by the Detroit Steel Products Co. At the annual meeting of the directors the following officers were elected: Walter S. Russel, president; Robert S. Drummond, vice-president; J. G. Rumney, secretary-treasurer and general manager. The officers and Leo M. Butzel, M. P. Rumney, and C. H. O. Meyer, form the board of directors.

The second of a series of conventions will begin Feb. 7. Instead of a single convention at which all the representatives of the company throughout the country take part, as in former years, there will be probably half a dozen conventions this year. At each of them there will be ten to twenty men coming from a certain district or section of the country. For instance, at next week's meetings there will be the representatives of the Detroit Steel Products Co., from New York, Boston, Philadelphia and other eastern cities.

KALAMAZOO, MICH., Feb. 2.—It is stated that the Light Car Axle Co., Chicago, has leased part of the old Michigan Buggy Co.'s plant here, and will locate here within the next three weeks. About seventy-five men are employed.

Gasoline Continues Upward Trend

Census Bureau Makes Report of Petroleum Refining in U. S.—176 Plants

NEW YORK CITY, Feb. 7.—Last week the general feeling with regard to the gasoline price situation was that things were rather uncomfortable and there was no relief in sight. To-day gasoline went up another cent to 23 cents, tank-wagon, in New York, and there are rumors of cent-a-week boosts for several weeks. "There is no money in gasoline even at 23 cents," according to one of the refining companies. As usual, Jersey City, across the Hudson, is just a cent behind New York. In Philadelphia there has been an increase of 2 cents, making the price 23 cents at the wagon; garages are charging from cost up to 26 cents.

In Boston the price, which was 23 cents last week, has gone up a cent to 24, making the retail prices 26 and 27 cents. Last winter gasoline was selling in Boston for 13 cents wholesale; the last increase is the eleventh since then.

In connection with the rising price of gasoline there is particular interest attached to the Census Bureau's summary for the oil refining industry for 1914 as compared with 1909. This report has just been made public and shows a marked increase of production—in some instances an enormous increase.

Production Increased 170 Per Cent

The 176 establishments reporting for 1914 used 191,262,724 barrels of crude petroleum, as compared with 120,775,439 barrels in 1909, the increase being 70,487,285 barrels, or 58.4 per cent. The cost of the crude petroleum, as reported for 1914, was \$249,727,856, an increase of \$97,420,816, or 64 per cent, over 1909.

The production of naphthas and lighter products, chiefly gasoline, increased from 10,806,550 barrels in 1909 to 29,200,764 barrels in 1914, or by 170.2 per cent, while the value increased from \$39,771,959 to \$121,919,307, or by 206.5 per cent.

The statement shows the production of casing-head gasoline in 1914 and includes a summary of the production of crude petroleum by fields in that year as reported by the United States Geological Survey.

The gasoline product of the petroleum refineries does not include casing-head gasoline condensed from natural gas at the gas wells. The total gasoline production, including casing-head gasoline, was 24,711,565 barrels of 50 gal., or 1,235,578,250 gal.

The production of lubricating oils here reported does not include that of establishments engaged in the compounding

or blending of petroleum oils, but only the output of petroleum refineries.

Of the 176 refineries in 1914, 48 were in Pennsylvania, 38 in California, 23 in Oklahoma, 13 in Kansas, 9 in Texas, 9 in Illinois, 8 in New Jersey, 7 in Ohio, 6 in New York, 4 in Colorado, 3 in Maryland, 3 in West Virginia, 2 in Wyoming, and 1 each in Indiana, Louisiana and Missouri.

Velie Will Not Change Bodies

MOLINE, ILL., Feb. 4.—The Velie Motor Car Co. has circularized its dealers to the effect that there seems to be some misunderstanding regarding the situation pertaining to model 15 cars. Actually the model 15s coming through the factory at this time are equipped with the same style bodies as have been used in the past. It is expected to furnish a different body for this chassis, but raw material deliveries are so uncertain that it is hardly possible to supply the new bodies before July 1 or thereabouts.

Aluminum Shortage Halts Plant

MANITOWOC, WIS., Feb. 7.—The first important instance of the effect of the rapidly diminishing supply of aluminum was the necessity encountered by the Manitowoc (Wis.) foundry of the Alum-

inum Castings Co. of closing down the plant for several days to await the arrival of new stocks of raw material. The Manitowoc foundry, like all divisions of the Aluminum Castings Co., has been working at full speed for several months to fill orders, principally for motor castings and parts. The supply of raw material has gradually been diminishing and the available supply advancing sharply in price. The company is assured of ample stocks for its requirements, but has met with some difficulty in getting prompt deliveries. The delay caused by the temporary cessation of work has been made up and deliveries of castings are going forward according to schedule.

Burman to Drive Premier

INDIANAPOLIS, IND., Feb. 3.—Bob Burman has signed a contract to drive Premier racing cars, which will be built in time to enter the 300-mile Indianapolis Speedway race on May 30. It is stated that he will have a voice in the construction of the car which he will drive. During his stay on the Pacific Coast where he will drive in the Ascot Park race, Feb. 22, he will build several parts for his Premier car, and will devote practically all of his time helping to complete a car.

PETROLEUM REFINING IN THE UNITED STATES—COMPARATIVE STATISTICS: 1909 AND 1914

	1914	1909	Per Cent of Increase* 1909-1914
Number of establishments	176	147	19.7
Crude petroleum used:			
Barrels (42 gallons)	191,262,724	120,775,439	58.4
Cost	\$249,727,856	\$152,307,040	64.0
PRODUCTS			
Total value	\$396,361,405	\$236,997,659	67.2
Naphthas and lighter products:			
Gasoline (from crude petroleum)—			
Barrels (50 gallons)	23,908,242	10,806,550	170.2
Value	\$106,140,170	\$39,771,959	206.5
All other—			
Barrels	5,292,522		
Value	\$15,779,137		
Illuminating Oils:			
Barrels	38,705,496	33,495,798	15.6
Value	\$96,806,452	\$94,547,010	2.4
Fuel oils:			
Barrels	74,669,821	34,034,577	119.4
Value	\$84,017,916	\$36,462,883	130.4
Lubricating oils:			
Barrels	10,348,521	10,745,885	—3.7
Value	\$55,812,120	\$38,884,236	43.5
Residuum or tar, including liquid asphaltic road oils:			
Barrels	2,696,887	1,787,008	50.9
Value	\$4,017,858	\$2,215,623	81.3
Greases:			
Barrels	280,128	138,302	102.5
Value	\$3,536,491	\$1,567,647	125.6
Paraffin wax:			
Barrels	1,150,776	946,830	21.5
Value	\$8,897,106	\$9,388,812	—5.2
Asphalt, other than liquid asphalt:			
Tons (2,000 pounds)	465,157	233,328	99.4
Value	\$4,867,213	\$2,724,752	78.6
All other products, value	\$16,486,942	\$11,434,737	44.2
Gasoline from natural gas (casing-head gasoline)—barrels (50 gallons) (United States Geological Survey)	†853,053		
Total gasoline production, excluding duplication as far as possible, barrels (50 gallons)	24,711,565		
CRUDE PETROLEUM PRODUCTION (United States Geological Survey)			
Total production, barrels (42 gallons)	265,762,535	183,170,874	45.1
California	99,775,327	55,471,601	79.9
Mid-Continent (Kansas, Oklahoma, etc.)	97,995,400	50,833,740	92.8
Pennsylvania grade (Appalachian)	24,101,048	26,535,844	—9.2
Illinois	21,919,749	30,898,339	—29.1
Gulf	13,117,528	10,883,240	20.5
Lima-Indiana	5,062,543	8,211,443	—38.3
Colorado, Wyoming and other fields	3,790,940	336,667	....

*A minus sign (—) denotes decrease. †Not included in refinery products.

Chevrolet Output To Be Doubled

Production To Be Stepped Up Monthly Until Plants Turn Out 460 Cars Daily

DETROIT, MICH., Feb. 9—President W. C. Durant has announced that within the next six months the daily output of the Chevrolet Motor Co., Flint, Mich., is to be doubled. It is at the rate of 230 cars a day now and is to be stepped up monthly until the plants are producing 460 daily in August. It is further stated that a new axle plant will be started here at once, while the work on the new assembling plant, an enlargement of the Mason motor plant and the new assembling plant in Oakland, Cal., also soon will be under way.

The assembling of the Chevrolet cars will be gradually concentrated at the assembling plants in New York City, Tarrytown, N. Y., St. Louis, Oakland, and Oshawa, Ont. All motors, axles and most of the parts needed will be made at the parent plant in Flint. In order to be able to get more workingmen the Chevrolet Co. will also put up about 100 homes.

Ascot Park Race March 5

NEW YORK, Feb. 9—The racing season will probably commence with the George Washington Sweepstakes, a 100-mile free-for-all on the Ascot Park Speedway in Los Angeles. A series of sprint races will be held at Ascot on March 5, and a 200-mile free-for-all on March 19. Prizes approximating \$18,000 have been hung up for the three Ascot meets.

The drivers, while in the West, will be able to compete in the Corona Grand Prize, which will be held over the 2.7-mile circular boulevard on April 8. The Corona classic is for a purse of \$12,000 and the distance is 301 miles.

George R. Bentel, well known in Pacific Coast racing circles, and Frank Lowry, who has been named starter of the four western races, are now in New York arranging details with the American Automobile Association.

Splitdorf Net Profits for 1915 Are \$745,107.55

NEWARK, N. J., Feb. 5—The Splitdorf Electrical Co., this city, reports net profits for 1915 of \$745,107.55, or a little over 16 per cent on its capital stock of \$4,393,000. The assets amounted to \$6,451,362.59, and the liabilities to \$5,317,333.20, leaving a net profit of \$1,134,029.39 to Dec. 31, 1915. The net profit to Dec. 31, 1914 was \$388,921.84.

The company received \$52,500 in divi-

dends from its subsidiaries, which report earnings totaling \$131,597.97, beside the dividends paid and excluding the operations of the Sumter Works, Sumter, S. C., belonging to the Apple Electric Co.

Locomotive Wins Patent Suit

PHILADELPHIA, PA., Feb. 5—Judge Buffington in the Circuit Court of Appeals sitting in this city reversed the decision of the lower court in the case of the Locomobile Company of America vs. Joseph W. Parkin, deciding the case in favor of the Locomobile Company. The case was decided in the lower court in favor of Parkin because of the alleged infringement of certain claims in a patent for a carburetor manufactured by Parkin. The decree was reversed on the grounds that no invention was involved in the patent and the cause was remanded with instructions to dismiss the bill.

Chalmers to Have New Branch

DALLAS, TEX., Feb. 6—Announcement was made in Dallas to-day that the Chalmers Motor Car Company of Detroit, Mich., will in the very near future establish a big branch house in Dallas. The company will also establish a warehouse in which will be kept the various materials; these will be sent to the various representatives in Texas. High officials of the company are expected in Dallas within a few days when a more detailed announcement will be made. This means a big addition to Dallas' Automobile Row, it is said.

Studebaker Plant in Dallas

DALLAS, TEX., Feb. 4—Contract has been awarded by Clarence Linz and M. B. Shannon of Dallas for the erection of a big brick building in Dallas to be occupied by the Studebaker company. This automobile concern, it is said, plans to establish a plant in this city that will cost upward of \$150,000. The plant will be located on South Harwood Street and Santa Fe Avenue. The total floor space will be 128,000 sq. ft. It will be the largest assembling plant in the State, it is said, employing several hundred men.

Syndicate to Market \$2,000,000 Peerless Truck Bonds

NEW YORK CITY, Feb. 8—About \$2,000,000 in Peerless Truck & Motor Corp. 6 per cent convertible gold bonds are to be marketed by a syndicate, composed of Hodenpyl Hardy & Co., this city.

The notes are dated Nov. 10 and mature Nov. 10, 1925. They are convertible at par on and after Nov. 10, 1916, at the option of the holder into common stock, par value \$50, of the corporation. They are part of a total outstanding issue of \$5,000,000.

Texas Obtains Injunction

Automobile Manufacturer May Not Limit Territory of Dealer Is Court Ruling

DALLAS, TEX., Feb. 2—Indications are that the State of Texas has considerable evidence in its alleged anti-trust suits against the Olds Motor Works and Turner and Davis and Cadillac Motor Car Co., Houston Motor Car Co. and the Munger Automobile Co. of Dallas, as injunctions were granted to-day, Feb. 2, in the district court at Austin. Defendants must also pay the court costs. This means that an automobile concern has not the right to restrict its agents to the sale of cars in a specified district in Texas. The suits were filed two weeks ago through the attorney general's department. No penalties were asked. The State got all it asked for.

Whitaker an Automobile Patent Expert

WASHINGTON, D. C., Feb. 8—During his connection of several years with the United States Patent Office as assistant examiner, N. T. Whitaker examined hundreds of applications for patents for automobile structures, particularly applications on internal combustion engines. He was connected with the division of the patent office where patents on automobile inventions are classified and examined. He has given special study to all inventions pertaining to every form of the automobile industry. Since leaving the patent office, about a month ago, Mr. Whitaker has opened an office in Washington and is making a specialty of patent work.

\$1,500,000 in Briscoe 7 Per Cent Cumulative Pref. Offered

DETROIT, MICH., Feb. 8—Andrews & Co. of this city, Cleveland and Chicago, is offering for subscription \$1,500,000 7 per cent cumulative preferred stock of the Briscoe Motor Corp. The shares are offered at \$105 with a bonus of 20 per cent in common stock. The capital stock of the corporation is \$1,500,000 preferred stock and \$4,000,000 common stock.

Tobin New Globe Tire President

TRENTON, N. J., Feb. 4—Horace B. Tobin was elected president of the Globe Rubber Tire Mfg. Co., this city, at the annual meeting of the company at Wilmington, Del., Feb. 1, succeeding W. H. Linburg. The other officers were re-elected as follows: Vice-presidents, J. S. Broughton, H. L. Joyce; treasurer, H. B. James, and secretary and assistant treasurer, J. P. Hall.

Four More Tire Prices Raised

Kelly-Springfield Lowers Quotations 10 Per Cent—Swinehart Still Unchanged

NEW YORK CITY, Feb. 7—Kelly-Springfield tire prices have been reduced 10 per cent on the popular sizes, making the present list about 15 per cent higher than the old prices in effect before announcement of its rise on Jan. 1. The 30 by 3 size, plain tread, is now listed at \$15.20 as compared with \$16.35; 34 by 4 is \$29.65, the former price being \$32.95; and the 36 by 4 is now \$31.50 as against \$35, formerly. On the non-skid types, the 30 by 3 is \$18.10, the 34 by 4 is \$36.25 and the 36 by 4 is \$38.20.

Nassau prices have been raised 10 per cent. Portage tires are also 10 per cent higher. The tubes have been raised 15 per cent. Braender has raised its prices 15 per cent. These prices apply only to the Eastern States, the quotations in the West being higher on account of freight rates. Combination prices have risen 10 per cent.

Swinehart is one of the few companies which still adheres to its old prices. It is stated that no changes in the near future are contemplated.

The following list of prices gives the present quotations on several of the popular-sized tires whose prices have been revised:

PORTAGE				
Plain Tread		Non-Skid		
	New Price	Old Price	New Price	Old Price
30 x 3 1/2 ..	\$14.10	\$12.80	\$16.15	\$14.70
34 x 4 ..	23.60	21.45	27.15	24.70
37 x 5 ..	38.85	35.30	44.65	40.60
BRAENDER				
30 x 3 1/2 ..	13.35	11.60	15.36	13.35
34 x 4 ..	22.30	19.40	25.65	22.30
36 x 4 ..	23.60	20.50	27.15	23.60
KELLY-SPRINGFIELD				
30 x 3 1/2 ..	15.20	16.35	.....	.....
34 x 4 ..	29.65	32.95	.....	.....
36 x 4 ..	31.50	35.00	.....	.....
COMBINATION				
30 x 3 ..	10.85	9.85	12.70	11.55
34 x 4 ..	23.60	21.45	27.10	24.65
36 x 4 1/2 ..	33.35	30.30	39.20	35.65

V Motors Oust Star Type in French Tests

PARIS, Dec. 30—Perfection of the automobile organization has made it possible for the French Military authorities to become more exacting in their tests of aeroplane motors. Until recently motors were subjected to a 10 hr. bench test under full load, no motor being considered unless it had gone through this test without a falter. Under the new regulations, motors must undergo a 50-hr. bench test. This is divided into two stages: 25 hr. at nine-tenths load and 25 hr. at full load. The first motor to

go through this test successfully was a De Dion Bouton eight-cylinder water cooled model. De Dion Bouton was the first to commercialize the eight-cylinder motor in France; it has been used on this firm's cars for more than three years, and attention has always been given to the same type of motor for aviation purposes. It was not until the war that the firm took up the aviation eight on a big scale.

There are a number of other new motors waiting to undergo their 50 hr. test. The majority of these are V-types, with either eight or twelve cylinders; a few are six-cylinder verticals. As the 10 hr. bench test under full load was looked upon as a serious undertaking, and was not passed by all competitors at the first attempt, the appearance of each engine for the 50 hr. test is being watched with more than ordinary interest. The fact that it is possible, under war conditions, to impose such a test, is proof that the authorities have developed output to such a degree that they can afford to refuse all but the very best motors. The fact that no more rotating cylinder motors are coming up for test, and that V motors are in a majority over all other type, is also significant as an indication of the trend of design.

Favor Horsepower Tax in D. C.

WASHINGTON, D. C., Feb. 5—The district commissioners have made a favorable report on the bill introduced in Congress by Representative Page, of North Carolina, to impose a special tax on automobiles in the District of Columbia, based upon horsepower. The commissioners, however, recommend that the bill be so amended as to provide for the elimination of the personal tax on motor vehicles.

The advisability of providing for a double tax is questioned by the commissioners. They believe that only one tax should be imposed, the amount of that to be determined on the horsepower basis. It is declared the double tax proposed by the bill would be excessive and burdensome. They say, for instance, the owner of a 25-hp. car valued at \$500 would, under the terms of the bill, be required to pay annually a license tax of \$7.50 and a personal tax of like amount. Because of the limited area in this jurisdiction, whether a car is used either for business or pleasure, it is pointed out, it is practically necessary to have a Maryland tag. This would mean, it is declared, in addition to the \$15 paid by the owner of the car under the bill, a further payment of \$15 would have to be made for the Maryland license. This amount the commissioners believe excessive and burdensome and therefore the elimination of the personal tax was recommended.

Municipal Cars Need License

Only Fire and Police Department Machines from License and Speed Laws

MILWAUKEE, WIS., Feb. 8—The question of whether or not public motor vehicles are amenable to the statutes requiring the licensing of such vehicles or the rules of speed, has practically been settled in Wisconsin by an opinion of the attorney general. Marc Catlin, district attorney of Outagamie County, Wis., asked if it is necessary for municipalities to register and obtain licenses for municipally-owned cars, and if such cars could exceed the established speed limits of 15 miles in cities and 25 m.p.h. in the country.

The attorney general states that fire and police departmental vehicles are exempt from both the licensing and speed limit requirements, but cars owned by cities and used for other municipal departments or divisions are not exempt from the State law. The opinion is based on the acknowledged principle of public necessity, which requires excessive speed. Fire and police cars are so distinguished as such that license plates are not needed to identify them.

New York State Registrations Increase 36 Per Cent

NEW YORK CITY, Feb. 3—Automobile registrations in this State increased 36 per cent in 1915 over the preceding year. Chauffeur licenses increased 21 per cent and the amount of money paid by owners increased 24 per cent. With the money from fines included, the total from the operation of motor vehicles to be set apart in 1916 for the maintenance of improved highways will be close to \$2,000,000.

All told, motoring credentials were issued to 316,185 persons. Of this number, 231,831 were owners, representing 208,421 passenger cars and 23,411 commercial vehicles; 82,153 chauffeurs were licensed and 2201 dealers received certificates. The fees aggregated \$1,913,175. The 1914 credentials totaled 235,602; passenger cars, 151,030; trucks, 17,193; chauffeurs, 66,636; dealers, 1743. The fees amounted to \$1,529,852, a big increase over 1913.

Maxwells Cheaper in Canada

WINDSOR, ONT., Feb. 5—Canadian prices of the Maxwell have been reduced by the Maxwell Motor Co. of Canada, Ltd. The touring car is now listed at \$850 instead of \$925 and the roadster sells for \$830 instead of \$900.

Detroit Fights Mich. Auto Law

Validity is Upheld in Test Case in Wayne County Court

DETROIT, MICH., Feb. 8—To-day the Wayne County Circuit Court upheld the new Michigan automobile tax law as being constitutional. The case will, however, be carried to the supreme court by the City of Detroit. Every one of the city's claims and reasons given that the law should be considered invalid was decided adversely by the judges. Should the highest court also uphold the law, it means that \$15,000,000 in personal property will be taken from the city's assessment rolls. According to this new law motor vehicles are taxed according to horsepower and weight. The money raised from the tax goes into the State's treasury and no other tax on automobiles is to be levied, which deprives the city of Detroit of a large amount formerly collected. One of the city's aldermen and the city prosecuting attorney filed suit against the Detroit Board of Assessors asking the court why a peremptory mandamus should not be issued by this court against the assessors.

Among the many reasons given why the new auto tax law should be considered invalid are the following: That the law discriminates in favor of manufacturers and dealers; that those in the taxicab business and manufacturers and dealers in other lines of business who own large numbers of motor vehicles are required to pay more taxes or a greater amount than the automobile manufacturer or the dealer in automobiles; that the value of the automobile is not taken into consideration in fixing the tax, for instance a motor vehicle several years old of high power is taxed more than a new automobile of less horsepower, yet of greater value, etc.

Georgia Legislature Sets 30 M.P.H. as Speed Limit

SAVANNAH, GA., Feb. 3—A number of radical changes in the automobile laws were made in the motor vehicle act at the recent special session of the legislature, and motor car drivers will have many new things to learn in order to comply strictly with the law.

The State law has no effect on municipal laws not in conflict, but sets a State speed limit of 30 m.p.h., with due regard to width, grade, traffic and common use of the highway. Ten miles an hour is the limit on curves, bridges, railroad crossings, deep descents, etc.

A provision of the law, applying both to automobiles and motorcycles, and based

on laws previously in force in several cities, prohibits the passing of any street car, interurban or other passenger train, while the same is standing still for the purpose of taking on or letting off passengers.

The provisions requiring the driver of a motor vehicle to slow down or stop when signalled by the driver of a horse-drawn vehicle and requiring motor vehicle drivers to slow down and give warning by their horns when approaching horse-drawn vehicles, are included in the act.

Any violation is made a misdemeanor.

Electrics Grow in England

NEW YORK CITY, Feb. 7—According to reports received by the Electric Vehicle Assn., recently from an English engineering firm, Heenan & Froude, Ltd., the use of electrics there has increased greatly in the past year, the number from 150 a year ago to 660 to-day. The use of electrics has been stimulated to a great extent by the war, for due to the numbers of men who have been taken from commercial occupations by the wholesale enlistments, the majority of the truck drivers in England to-day are women. The electric is simpler to operate than the gasoline truck, and therefore better adapted to use with female labor.

Another effect of the war has been to effect almost universal withdrawal of certain classes of gasoline trucks, through commandeering, so that to protect themselves, many firms have adopted electrics, for which the government has no need.

3,000,000 Hayes Wheels for 1916

JACKSON, MICH., Feb. 5—During 1915 there were made at the local plant of the Hayes Wheel Co., a total of 1,723,490 wheels, or more than twice as many as in 1914 and more than five times as many wheels as in 1913. There were on the average 1000 men on the company's payroll during the year, but at times the number of shop workers was close to 1400.

The company expects that its estimate of 3,000,000 wheels for 1916 will be below the actual output when the year ends. The production has been remarkably rapid. In 1909 only 81,416 wheels were made at the plant; in 1910 the total was 145,660; in 1911 it was 299,576; in 1912, 322,599; in 1913, production was 333,523; in 1914 the total was 844,609. The total production during those seven years was thus 3,750,872 wheels, or at the rate of four wheels to an automobile, wheels for 937,718 automobiles.

Besides its main plant here, the Hayes company operates a large plant in Anderson, Ind., and has its hub factory in Albion, Mich. These plants employ several hundred men.

Britain Prevents Driver Shortage

London Omnibus Co. Institutes Army School—Lighting Restrictions Very Severe

LONDON, Jan. 15—No more automobile drivers can now be enlisted direct into the mechanical transport service of the British army. The shortage of drivers for civilian purposes has become so acute that users have protested and pointed out that the essential trade of the nation is likely to be paralyzed if more skilled drivers are taken off their ordinary jobs and put into the army. In consequence of this the army has undertaken to train its own drivers and for this purpose has entered into an agreement with the London General Omnibus Company.

At the main depot of this concern recruits, many of whom have never previously sat behind a steering wheel, are now being initiated into the mysteries of the internal combustion motor and taught to drive in regulation convoy formation. The Omnibus company has all the machinery necessary for this training and ought to be able to turn out efficient men in bigger quantities than is possible by any other group. It is understood that these recently trained men will be used to dilute the ranks of skilled drivers. Thus no formation will be composed entirely of new men, but a certain proportion of old and experienced drivers will be retained in each.

No information is allowed to get out regarding the number of men who are being trained in this way, but it is known that the force is considerable. One result of this scheme will be a certain cash saving. Specially enlisted drivers, thousands of whom were taken on during the first months of the war, were paid at the rate of \$1.44 per day; the men who are being trained to drive get 24 cents.

Darkness Almost Absolute

During the last few days drastic anti-lighting regulations have gone into force in the greater part of England. It requires a lawyer's training to understand the details of the order, for it is divided in a complicated manner into schedules and the whole of the country divided into areas, each one of which has its special restrictions. Briefly, no brilliant lights are allowed anywhere in England, and around the coast is a strip varying in width from six to 100 miles, within which automobiles must reduce lights to a mere glimmer. Even at Warwick, Coventry and Leamington, in the heart of England, special regulations are in force against lights on vehicles. In the London district headlights are tabooed and side lamps have to be reduced

in intensity until they are absolutely useless to the driver. While automobiles have to reduce their lights, other vehicles which formerly carried no light at all must now display a glimmer at the rear. This applies to bicycles, which must show a white light in front and a red light behind, and also to baby carriages.

Automobile drivers are protesting energetically but uselessly against the new regulations. Wherever possible the simplest plan is not to use an automobile at all after dark, but this is not possible in the case of commercial vehicles, and is only applicable with difficulty to certain professions. Doctors are threatening that they will not respond to night calls if there is not some relaxation in the lighting regulations.

There is no doubt that the British authorities have become scared as the result of the last Zeppelin raids over various parts of the country. Lighting has now been reduced to such a degree that the remedy is undoubtedly worse than the disease. Many towns in the heart of England are darker than French towns within artillery fire of the German lines. The London restrictions regarding automobile lights are much more severe than those in Paris and district, although the French capital is only sixty miles from the German front line trenches.

Britain Makes Accessories Contraband

WASHINGTON, D. C., Feb. 5—According to a proclamation of Jan. 27 the British Government has made several changes on its lists of absolute contraband, among them being, in regard to item 26, motor vehicles, etc., "there shall be added after the word 'parts,' the words 'and accessories.'"

Overland Features Securities

Common Rises 19 Points—Studebaker Stronger—General Motors Down to 445

NEW YORK CITY, Feb. 8—Automobile securities last week were fairly active with a majority of them subject to large gains and losses. Violent trading in these stocks has subsided during the past few weeks. Willys-Overland during the latter part of last week was active, reaching 220 on Saturday with a 19-point gain. This issue together with a 10½-point gain in Packard common, featured the stock exchange activities in automobile stocks. Studebaker pulled itself out of last week's loss by registering a 4-point gain on its common and 1 point on the preferred. These stocks have been active on account of dividend action taken by the directors of the company this week. Maxwell common and second preferred were strong last week with substantial gains.

General Motors Drops 15 Points

Losses last week ranged from a fraction to 15 points. General Motors, which has been steadily declining during the last few weeks dropped 15 points to 445 with little activity. Chalmers common went down 10 points. Kelly-Springfield common and the new common declined 8 and 2 points, respectively. Incidentally a ruling has been made in regard to the new common stock of Kelly-Springfield by the New York Curb Market Assn. This ruling states that Feb. 8 shall be the

date of delivery in settlement of all outstanding when, as and if issued contracts in the new \$25 common stock of that company, without further notice. Holders of the \$100 par value common stock certificates may exchange them for the new ones at the Equitable Trust Co., from now on.

The Detroit issues were more or less constant during the week with small changes. General Motors quoted on Saturday at 445, just 5 points higher than a week before. This was the largest gain of the week in the active stocks. The rest of the gains ranged from a fraction to 1½ points. The losses were small ranging from 1 to 2½ points. The inactive stocks were strong. Kelsey Wheel rose 135 points.

Steel Up \$2 a Ton

NEW YORK CITY, Feb. 8—The rise of \$2 per ton in Bessemer and open-hearth steel featured the material markets last week. Bessemer steel is now selling at \$34 a ton and open-hearth steel at \$35. Aluminum and copper have also risen, the former rising 1 cent to 54 a pound, and the latter 1½ cents to 27½ a pound. The supply of copper at present is scarce. Spot copper is now commanding a premium of a ½ cent to a cent over the future quotation. Leading sellers report that unsold supplies for forward delivery are exceedingly small and the problem of meeting the demand grows more serious each day. There is a large demand for aluminum. Lead has receded to \$6.13 a 100 lb. Tin has also gone down, reaching \$41.50 per 100 lb. yesterday, just 38 cents lower than a week ago.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915		1916		Wk's Ch'ge
	Bid	Asked	Bid	Asked	
Ajax Rubber Co. (new).....	..	..	68¼	69	— ¼
Aluminum Castings pfd.....	95	100	..	..	..
J. I. Case pfd.....	..	85	85	87	—1
Chalmers Motor Co. com.....	..	94	110	140	—10
Chalmers Motor Co. pfd.....	91	94	99	101	—1
Chevrolet Motor Co.....	..	..	126	130	+1
Electric Storage Battery Co.....	47½	48½	62	63	+1
Firestone Tire & Rubber Co. com.....	370	375	730	..	..
Firestone Tire & Rubber Co. pfd.....	109	111½	112	..	..
General Motors Co. com.....	93½	94½	445	455	—15
General Motors Co. pfd.....	94½	95½	110	112	—1½
B. F. Goodrich Co. com.....	32	32¼	71	72	+2
B. F. Goodrich Co. pfd.....	96¼	97	112	114	+ ½
Goodyear Tire & Rubber Co. com.....	193	196	337	341	..
Goodyear Tire & Rubber Co. pfd.....	101	102½	115½	116½	..
Gray & Davis, Inc., pfd.....	..	..	22	25	..
International Motor Co. com.....	..	..	35	40	—3
International Motor Co. pfd.....	..	..	70	74	—2
Kelly-Springfield Tire Co. com. (old).....	104	105	280	290	—8
Kelly-Springfield Tire Co. com. (new).....	..	..	70	74	—2
Kelly-Springfield Tire Co. 1st pfd.....	82	83	95	97	+4
Kelly-Springfield Tire Co. 2d pfd.....	115	117	71	73	+4
Maxwell Motor Co. com.....	17½	18	70½	71½	+3½
Maxwell Motor Co. 1st pfd.....	58½	58¾	87	89	..
Maxwell Motor Co. 2d pfd.....	21¼	22¼	53	54½	+1½
Miller Rubber Co. com.....	158	165	274	278	+4
Miller Rubber Co. pfd.....	101	103	113	115	..
New Departure Mfg. Co. com.....	117	122	110	..	..
New Departure Mfg. Co. pfd.....	105	107	81	..	..
Packard Motor Car Co. com.....	..	100	167½	177½	+10½
Packard Motor Car Co. pfd.....	93	..	102	104½	— ½
Paige-Detroit Motor Car.....	..	..	700	..	..
Peerless Motor & Truck Corp.....	..	..	26	26½	—1
Portage Rubber Co. com.....	30	36	65	70	—5
Portage Rubber Co. pfd.....	80	86	107	109	—5
Regal Motor Co. pfd.....	..	..	12	..	— ½
*Reo Motor Truck Co.....	11½	12½	27	28½	—1½
*Reo Motor Car Co.....	24½	25½	34¼	35¼	+ ¼
Splitdorf Electric Co. pfd.....	..	..	..	..	..
Stewart-Warner Speed. Corp. com.....	49½	50½	85	87½	—3

	1915		1916		Wk's Ch'ge
	Bid	Asked	Bid	Asked	
Stewart-Warner Speed. Corp. pfd.....	100	103	108	..	..
Studebaker Corp. com.....	45½	50½	149	151	+4
Studebaker Corp. pfd.....	94	103	111	113	+1
Swinehart Tire & Rubber Co.....	69	71	88	89	+1
Texas Co.....	131	135	205	206	+9
U. S. Rubber Co. com.....	56¼	57	51	52	+2
U. S. Rubber Co. pfd.....	101½	103	105½	106½	+1
Vacuum Oil Co.....	193	196	223	227	..
White Motor Co. (new).....	..	..	51	51½	+ ½
Willys-Overland Co. com.....	95	97	220	230	+19
Willys-Overland Co. pfd.....	95	97	104	106	— ½

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS				
Chalmers Motor Co. com.....	..	120	130	—15
Chalmers Motor Co. pfd.....	..	94	97	—2½
Continental Motor Co. com.....	175	200	..	300
Continental Motor Co. pfd.....	70	..	91	..
Ford Motor Co. of Canada.....	500	..	415	..
General Motors Co. com.....	93¼	95	445	480
General Motors Co. pfd.....	94	96	110½	112
Maxwell Motor Co. com.....	17½	18½	69	71½
Maxwell Motor Co. 1st pfd.....	58	60	87	89
Maxwell Motor Co. 2d pfd.....	21½	23	52	55
Packard Motor Car Co. com.....	..	100	165	..
Packard Motor Car Co. pfd.....	93	..	103½	—1
Paige-Detroit Motor Car Co.....	..	..	700	..
*Reo Motor Car Co.....	24½	25	34½	35½
*Reo Motor Truck Co.....	11½	12½	27½	28½
Studebaker Corp. com.....	45½	47½	146	149
Studebaker Corp. pfd.....	94	96	109	114

INACTIVE STOCKS				
*Atlas Drop Forge Co.....	..	25	32¼	..
Kelsey Wheel Co.....	195	215	435	+135
*W. K. Prudden Co.....	18¼	19¼	..	33½
Regal Motor Car Co. pfd.....	..	25	12	..

*Par value \$10. †And accrued dividend.

No material changes in prices in crude rubber occurred last week. This product is, however, more active with a firmer tone. Reports from London state that there is now a more plentiful supply of spot rubber, which is calculated to remove all apprehension among consumers for the near future. Para is now quoting at 75 while Ceylon Pale Crepe is a little higher at 83.

Gasoline in this city went up 1 cent yesterday in price to 23 cents a gallon, wholesale. Jobbers throughout the city are selling gasoline at prices running from 25 to 28 cents.

Copper Rise Affects Carbureters

CHICAGO, ILL., Feb. 5.—What the increased metal prices is costing the motor car and accessory business is well indicated by the increased price of copper now selling at 26 cents per pound as compared with 14 cents in June. As a result of this increase the carbureter industry will during the coming calendar year pay approximately \$750,000 additional for copper alone. This bill would be much greater were it not that many of the carbureters which were water jacketed last year are made without water jackets this season, the result being considerably less copper used in the casting.

Averaging the copper increase at 10 cents per pound, which is conservative, and calculating on 1,200,000 carbureters being needed for 1916, for cars, motorcycles and motorboats, and allowing an average of 5 lb. per carbureter, the total of 6,000,000 pounds of copper is obtained. This at 10 cents per pound increase gives a total advance of \$600,000.

Holland Prohibits Rubber Exportation

THE HAGUE, Jan. 27.—The exportation of rubber from Holland is prohibited by royal decree to-day. It is understood that as this measure will cut off exports to Germany, Great Britain will order no further interference with shipments of rubber to Holland. In the past rubber cargoes have been held up until it was proved conclusively that they were not consigned to German agents in Holland.

Russell-Overland Merger Made

Deal Long Talked of Now Complete—New Co. is Willys Overland, Ltd.

MONTREAL, CAN., Feb. 3.—T. A. Russell of Toronto was a guest of the Montreal Automobile Trade Association on the occasion of the opening of the automobile show Saturday. Mr. Russell stated in an interview that the amalgamation of the Russell Motor business and the Willys-Overland of Canada has now been completed. A charter has been granted for the new company, to be known as Willys-Overland, Limited, of which John N. Willys is president, and Mr. Russell, vice-president.

The factory at West Toronto is being extended and enlarged with the idea of taking care of exports of Overland cars for the British Empire, as well as the Canadian trade, so as to secure a greater volume of production. The policy of maintaining branches with service stations in each province will be continued. Commencing with Feb. 1 the Russell branch in Montreal will take over the combined Overland and Russell business for the entire province of Quebec. J. R. Marlow will manage the business as formerly.

For the present the branch will remain at 5 Park Avenue and will be known as Willys-Overland, Limited, Montreal branch. A track warehouse has also been secured in the shipping district, and it is intended to keep up factory production during the winter months, sending the cars into storage for early spring shipment. In this way 300 to 400 cars will be accommodated in Montreal.

Chandler Stock on 6 Per Cent Basis

CLEVELAND, OHIO, Feb. 7.—The Chandler Motor Car Co., this city, has declared a quarterly dividend, payable April 1 to stockholders of record March 7, of

1½ per cent on the stock, thus placing it on a 6 per cent annual basis. The company has no bonds or preferred stock outstanding, and the directors state that they believe the 6 per cent rate is conservative as earnings before April 1 will be equal to 6 per cent on the stock.

On Feb. 4, the company had a cash balance of \$1,593,675, which is equivalent to more than \$20 a share on its outstanding stock. Sixty cars are being shipped daily, and the output will be materially increased by March 1.

Convention to Discuss Ohio Laws

AKRON, OHIO, Feb. 6.—Reforms in Ohio's traffic and highway code are to be discussed at the annual convention of the Ohio State Automobile Association, which is to be held at Akron, March 31 and April 1.

It is forecast that another movement will be inaugurated to have a general lighting law enacted in Ohio. Since the last session of the legislature there has been a considerable increase in sentiment for the carrying of lights by all vehicles. A recommendation to this effect has been made by State Highway Commissioner Cowen, and the motor organization, in combination with other associations, will seek to have this enacted into the state code.

Vesta Clutch Proves Good

(Concluded from page 284)

are not slid into mesh; consequently there is no clashing or grinding of the gears.

After reaching a speed of 20 m.p.h., the neutral button was pushed in, which broke all electrical connections in the car. It was then demonstrated that the centrifugal force was sufficient to drive the car, as well as to pick up to any higher speed desired, this being done without the aid of any electric or magnetic connection whatever.

Threading the city's traffic at a time when the homeward-bound motorists and pedestrians and the long lines of street cars offer the severest test of a car's handling qualities, we negotiated the streets, at a snail's pace, stopped and started again in obedience to the policeman's whistle and did it all on high. Also we did it with the smoothness and ease of an electric.

In just what way the Vesta Accumulator Co. will market the new device is not fully determined as yet. Officials express the intention to license the Morrison patents to car builders. In addition it is expected that the Vesta people will be building a car before the middle of summer, which will have the new system as the feature.

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum	.53	.53	.53	.53	.53	.54	+.01
Antimony	.43½	.43½	.43½	.44	.44	.44	...
Beans and Channels, 100 lb.	2.17	2.17	2.17	2.17	2.17	2.17	...
Bessemer Steel, ton	32.00	32.00	34.00	34.00	34.00	34.00	+2.00
Copper, Elec., lb.	.26	.26½	.26½	.26½	.26½	.27½	+.01½
Copper, Lake, lb.	.26	.26½	.26½	.26½	.26½	.27½	+.01½
Cottonseed Oil, bbl	9.10	9.13	9.21	9.24	9.32	9.27	+.17
Cyanide Potash, lb.	.28	.28	.28	.28	.28	.28	...
Fish Oil, Menhaden, Brown	.51	.51	.51	.51	.51	.51	...
Gasoline, Auto, bbl	.22	.22	.22	.22	.23	.23	+.01
Lard Oil, prime	.94	.94	.94	.94	.94	.94	...
Lead, 100 lb.	6.15	6.12½	6.15	6.15	6.15	6.13	-.02
Linseed Oil	.73	.73	.73	.73	.73	.73	...
Open-Hearth Steel, ton	33.00	33.00	35.00	35.00	35.00	35.00	+2.00
Petroleum, bbl., Kansas, crude	1.30	1.30	1.30	1.30	1.30	1.30	...
Petroleum, bbl., Pennsylvania, crude	2.35	2.35	2.35	2.35	2.35	2.35	...
Rapeseed Oil, refined	1.00	1.00	1.00	1.00	1.05	1.05	+.05
Rubber, Fine Up-River, Para	.74	.74	.74	.76	.75	.75	+.01
Rubber, Ceylon, First Latex Pale Crepe	.76	.81	.80	.83	.82	.83	+.07
Sulphuric Acid, 60 Baume	2.00	2.00	2.00	2.00	2.00	2.00	...
Tin, 100 lb	41.88	41.50	41.38	41.63	41.63	41.50	-.38
Tire Scrap	.05¾	.05¾	.05¾	.05¾	.06	.06	+.00¾

Factory Miscellany

Covert Motor Vehicle to Build—A contract for the erection of a four-story building at Lock and Grand Streets, Lockport, N. Y., has been awarded by the Covert Motor Vehicle Works. The building will be of concrete and will be 150 by 150 ft.

Tire Plant for Wakefield—T. E. Dwyer has succeeded in getting the Motor Tire Reconstruction Co. of New York to build a factory at Wakefield, Mass., for its New England branch, work being started on a structure on Broadway so designed that it may be enlarged from time to time.

Goodyear to Build Garage—The Goodyear Tire & Rubber Co., Akron, Ohio, has purchased a large tract on Market Street, opposite its plant, where a large garage is to be erected. Tentative plans call for an expenditure of \$50,000 for the garage. The B. F. Goodrich Co. took similar action some time ago, having purchased a site upon which a large garage is being erected.

Celfor Tool to Enlarge—Several thousand dollars are to be spent by the Celfor Tool Co., Buchanan, Mich., on dif-

ferent enlargements of the plant. There will be a new shop building, a new office building, a storehouse, a new boiler plant and a 73-ft. smokestack. It will take about four months to complete the enlargements.

Continental Rubber Co. Formed—L. J. Weadock and C. E. Sprague of Toledo; G. W. Doerzbach, J. J. Daach, J. T. Sloat and Sidney Frohman of Sandusky, have incorporated the Continental Rubber Co., Sandusky, Ohio, with a capital of \$500,000, to manufacture automobile tires. The company has made arrangements to take over the now unoccupied plant of the Erie Reduction Co., in the southwestern outskirts of the city.

Briscoe Building—Construction of a new one-story office building, 300 ft. long, will be started shortly by the Briscoe Motor Co., Jackson, Mich. An addition is now being erected to the motor department, also a one-story stock room, between the motor and assembly rooms. Gradually other enlargements will be made and by the end of July it is expected that there will be room to give employment to at least 2000 men.

Battery Plant for Peoria—Frank B. Kamarke, will open a manufacturing plant in Peoria, Ill., for storage batteries. It is claimed that batteries can be constructed as economically in central Illinois, as in the East. The plant will be located on Knoxville Avenue and will be ready for business early in February. Mr. Kamarke was for a number of years connected with the Fashion garage of Peoria and has specialized in batteries.

K. C. Tire Plant Progressing—The work of remodeling the factory building recently leased by the newly-organized Kansas City Tire and Rubber Corp., Kansas City, Mo., has gone ahead so successfully that the announcement has been made that the company will be producing five hundred tires daily within the next month. The company also controls a plant in Chester. It will be continued as a part of the Kansas City company, manufacturing the Chester and Traveler tires. The local plant is being constructed with a capacity of one thousand tires daily, but this output will not be attempted for several months. Five hundred men will be employed here.

The Automobile Calendar

Feb. 7-12.....	Kansas City, Mo., Show, J. I. Case, T. M. Bldg., Kansas City Motor Dealers' Assn.	Feb. 21-26.....	Bridgeport, Conn., Show, State Armory. B. B. Steibler, Mgr.	March 15-18.....	Trenton, N. J., Show, Armory, under auspices of Chamber of Commerce.
Feb. 7-12.....	Duluth, Minn., Show, Armory, Duluth Automobile Dealers' Assn.	Feb. 21-26.....	Louisville, Ky., Show, First Regiment Armory.	March 21-25.....	Deadwood, S. D., Show, Auditorium, Deadwood Business Club.
Feb. 8-11.....	Grand Forks, N. D., Show, Auditorium.	Feb. 21-26.....	Omaha, Neb., Show, Omaha Automobile Show Assn.	March 28-April 3..	Manchester, N. H., Show, Under Auspices Couture Bros. Academy.
Feb. 8-12.....	Freeport, Ill., Show, Freeport Auto Dealers and Garage Owners' Assn., Henney Buggy Plant.	Feb. 21-26.....	Portland, Me., Show, Exposition Bldg.	April 10-15.....	Seattle, Wash., Show, Arena.
Feb. 9-12.....	Peoria, Ill., Show, Coliseum, Peoria, Automobile and Accessory Assn.	Feb. 21-26.....	South Bethlehem, Pa., Show, Coliseum. J. S. Elliot, Mgr.	May.....	Chicago, Ill., Speedway Race for Amateurs, Speedway Park Assn.
Feb. 12-19.....	Albany, N. Y., Show.	Feb. 21-26.....	Syracuse, N. Y., Show, Syracuse Automobile Dealers.	May 6.....	Sioux City, Ia., Speedway Race, Sioux City Speedway Assn.
Feb. 12-19.....	Hartford, Conn., Show, First Regiment Armory, Hartford Automobile Dealers' Assn.	Feb. 23-26.....	Bay City, Mich., Show, Bay City Automobile & Accessory Dealers' Assn.	May 13.....	New York City, Vanderbilt Cup, Sheephead Bay Speedway Race.
Feb. 14-19.....	Elmira, N. Y., Show, Elmira Auto Club.	Feb. 28-March 3..	Pittsburgh, Pa., Convention of American Road Builders' Assn., Mechanical Hall.	May 30.....	Indianapolis Speedway Race.
Feb. 14-19.....	Nashville, Tenn., Show, Hippodrome. J. A. Murkin, Mgr.	Feb. 28-March 4..	Cedar Rapids, Ia., Show, Cedar Rapids Automobile Dealers' Assn.	June 10.....	Chicago Speedway Race.
Feb. 14-19.....	Des Moines, Iowa, Show, Des Moines Auto Dealers' Assn.	Feb. 28-March 4..	Paterson, N. J., Fifth Annual Show, Auditorium.	June 28.....	Des Moines, Iowa, Speedway Race.
Feb. 14-19.....	Winnipeg, Man., Show, Ford Plant, Winnipeg Motor Trades Assn.	Feb. 29-March 4..	Ft. Dodge, Iowa, Show, Terminal Bldg., Ft. Dodge Automobile Dealers' Assn.	July 2-6.....	Detroit, Mich., World's Salesmanship Congress, Detroit Board of Commerce Bldg.
Feb. 16-19.....	Rockford, Ill., Show, Coliseum, Motor Car Dealers Assn.	March 5.....	Los Angeles, Cal., Speedway Race, Ascot Speedway Assn.	July 4.....	Coeur D'Alene, Idaho, Race Meet, Hilles-Riegel.
Feb. 17-19.....	Racine, Wis., Show, Lakeside Auditorium.	March 4-11.....	Boston, Mass., Car and Truck Show, Mechanics Bldg.	July 4.....	Minneapolis Speedway Race.
Feb. 19.....	Newark, N. J., Show, First Regiment, Armory, C. G. Fitzgerald, Mgr.	March 8-11.....	Davenport, Iowa, Show, Tri-City Davenport, Rock Island & Moline; Tri-City Automobile Trade Assn.	July 4.....	Sioux City Speedway Race.
Feb. 19-26.....	Harrisburg, Pa., Show, Emerson-Bruntingham Co.'s Bldg., Capital City Motor Dealers' Assn.	March 8-11.....	Mason City, Iowa, Show, Armory.	July 15.....	Omaha, Neb., Speedway Race.
Feb. 20-27.....	Grand Rapids, Mich., Show, Klingman Furniture Exhibition Bldg., Automobile Business Assn.	March 8-15.....	Brooklyn, N. Y., Show, Brooklyn Motor Dealers' Assn.	Aug. 5.....	Tacoma Speedway Race.
		March 9-11.....	Kenosha, Wis., Show, Kenosha Retail Assn., Kenosha Farmers' Session.	Aug. 18-19.....	Elgin Road Race.
				Sept. 4.....	Des Moines Speedway Race.
				Sept. 4.....	Indianapolis Speedway Race.
				Sept. 16.....	Providence Speedway Race.
				Sept. 30.....	New York City Sheephead Bay Race.
				Oct. 7.....	Omaha Speedway Race.
				Oct. 14.....	Chicago Speedway Race.
				Oct. 19.....	Indianapolis, Ind., Race, Indianapolis Motor Speedway.

The Week in the Industry



Anderson Joins Sun—John Anderson has joined the Sun Motor Car Co., Elkhart, Ind., as assistant factory manager. He formerly occupied a similar position with Chandler Motor Car Co., Cleveland.

Jones Beaver Superintendent—Frank Jones has been engaged by the Beaver Manufacturing Co., Milwaukee, Wis., as factory superintendent, succeeding W. A. Carroll, resigned. Mr. Jones took charge Feb. 4.

Sehl Joins Studebaker—J. P. Sehl, commercial body designer, Pierce-Arrow Motor Car Co., Buffalo, N. Y., has resigned to accept a position in the body designing department of the Studebaker Corp., Detroit.

Corman Makes New Connection—E. W. Corman, who was advertising manager of the Saxon Motor Co., has become sales and advertising manager of the Wetmore-Quinn Co., Detroit distributor for the Saxon and Paige.

Bowman White's Columbia Mgr.—F. P. Bowman, formerly of Chicago, Ill., has succeeded R. D. Lampert of this city as manager for the White Co., Cleveland, Ohio, in Columbia, S. C., handling the State. Mr. Lampert has engaged in business for himself.

Grimes Joins National—C. P. Grimes will on Feb. 15 become assistant in charge of the experimental department of the National Motor Vehicle Co., Indianapolis, Ind. Mr. Grimes has for the past 4½ years been connected with Wheeler & Schebler, Indianapolis, in the capacity of technical engineer.

New Braender Tire Managers—The Braender Rubber & Tire Co., Rutherford, N. J., has opened branches in Chicago, Ill., at 1350-54 South Michigan Avenue, and in Philadelphia at 1327 Race Street. The Chicago branch is under the management of W. J. Heathcock and the Philadelphia branch is under W. L. Porter.

Smith Heads American Malleables Office—The American Malleables Co. has opened offices at 1607 Kresge Building, Detroit, Mich., in charge of P. G. Smith, assistant sales manager of the company. The company has two plants, located at Lancaster, N. Y., and Owosso, Mich., and makes a specialty of nothing but malleable castings for the automobile trade.

Elwood Joins Remy—J. L. Elwood, formerly superintendent of the Eureka Electrical Mfg. Co., North East, Pa., has been appointed director of service

Motor Men in New Roles

for the Remy Electric Co., Anderson, Ind. Mr. Elwood has been engaged in the electrical manufacturing business for quite a number of years, having previously been with the Remy company in the production end of the business.

Zeigler Co. Starts Operations—The Zeigler Manufacturing Co., Alexandria, Ind., is just starting operations. It has secured the American Wheel Works plant at Alexandria, Ind., which is well equipped for the manufacture of steel stampings and machine products, suitable for the automobile trade. Sales offices have been opened at 910 Merchants' Bank Building, Indianapolis.

Radford Succeeds Gloetzner—W. H. Radford has been appointed assistant engineer in charge of design by the Chalmers Motor Co., Detroit, Mich. He succeeds A. A. Gloetzner, who recently resigned.

K. M. Wise was appointed assistant engineer in charge of the experimental division. He was formerly with the Studebaker Corp. and the Crucible Steel Co. of America.

New Interests in Cleveland Cole—S. S. Mier and E. J. Arnstine have secured a controlling interest in the Cole-Cleveland Co., Cleveland, Ohio, distributor for Cole cars in sixteen counties in northern Ohio. Mr. Mier has been made president of the company and Mr. Arnstine secretary and treasurer. J. M. Smith, former local manager of the company, will continue with it. There will be no change in the line or in the territory and the policy of the company will be continued as in the past.

Fagersten Jeffery Foreign Rep.—Wallis Fagersten of Rockford, Ill., has accepted a position with the Thomas B. Jeffery Co., Kenosha, Wis., to enter its foreign service as traveling representative. He will spend two months at the Kenosha factory in order to become acquainted with the manufacture of trucks suitable for army service, and will spend most of his time in Russia and France meeting purchasing agents of those governments and supervising deliveries.

Changes in Bearings Co. of America—The following changes have recently been made in the Bearings Co. of America, New York City: J. W. Hertzler, who has been for several years past Western representative of that company, has been appointed assistant manager, and is now located at the factory of the com-

pany in Lancaster, Pa. Mr. Hertzler is being succeeded in the Detroit office at 604 Ford Building by W. C. Little, who has represented Brandenburg & Co. and the Buda company in that territory.

Changes Planned in Mid-Continent Tire—Several changes probably will be made soon in the directorate of the Mid-Continent Automobile Tire Co., now operating a plant in Wichita, Kan. R. E. Price of Denver already has retired from the company and his place has been taken by A. O. Rorabaugh of Wichita. Most of the stock is owned in Wichita and it is planned to enlarge the directorate from five to nine and fill it with local business men. The plant will have a capacity of about 400 tires daily.

Albright and Williams Make Changes—W. D. Albright, who for the past two years has been manager for the Portland, Ore., branch of the B. F. Goodrich Co., and C. H. Williams, manager of the Portland branch of the Goodyear Tire & Rubber Co., have both received new appointments. Mr. Albright is now Northwest manager of all lines of the Goodrich company, with supervision over all of Oregon, Wash., northern Idaho, western Montana, British Columbia, Alberta and all of Alaska. Mr. Williams has been named manager of the Goodyear branch in Chicago, and J. A. Leatherman has assumed management of the Portland branch.

Boston Trade Changes—E. A. Francis, formerly assistant manager of the wholesale branch of the Saxon Motor Car Co., Detroit, has been made manager, taking the place of F. S. Sumner, who resigned recently to join the O. L. Halsey Company, Chalmers dealers.

F. C. Stetson has been placed in charge of the new tire department handling Mohawks at the Green & Swett Co. on Boylston Street.

Howard Blossom has been appointed manager of the wholesale department of the Jackson Motor Car Co. of New England, taking the place of A. C. McIntyre.

J. W. Bowman, one of the pioneers in the Hub, has added the Daniels Eight to his Velie line.

Bradford Kinsley has been placed in charge of the commercial department of the Coburn-Draper Co., Maxwell agent.

A. C. White, Jr., has resigned from the New England branch of the White Company and taken on the agency for the Vim line.

New Quarters for N. Y. Chandler—The Brady-Murray Motors Corp., New York City dealer of Chandler cars, has practically completed the removal of its service station and stock room department from the old quarters at 245 West Fifty-fifth Street to the new quarters at 1886 Broadway.

Dallas Items—Special representative Louis Goodlet of the Lewis Spring & Axle Co. was in Dallas recently and practically completed arrangements for the handling of the Hollier Eight.

The Johnson Shock Absorber Co. of Texas has established headquarters at 1305 Young Street, Dallas. A. D. Crum is in charge. The Dallas house will carry a full line of Johnson absorbers.

The A. B. Auto Supply Co. is the latest addition to automobile row in Dallas. C. R. Rodeman, formerly with the Firestone Tire & Rubber Co., is in charge. The company has acquired the business of the Walter Barnes Rubber Co. and will carry a full line of automobile supplies.

The Atlas Tire Co. of Kansas City has established an office in Dallas at 2006 Commerce Street.

New Chase Co. in Chicago—L. P. Rasmussen & Co., 2419-2421 South Park Avenue, Chicago, has taken over the Chase line in the Chicago territory. Heretofore the Chase has been represented in Chicago by the Chase Motor Truck Sales Co., a local company organized by H. T. Bouldon, general sales manager for the Chase Motor Truck Co., Syracuse, N. Y., and was conducted as a factory branch. The new dealer will take over the line at once and the factory salesroom at 2027 South Michigan Avenue will be vacated. L. F. Stevens, who has been acting as Chicago manager, will remain with the Chase organization as division sales manager, with headquarters in Chicago.

Cleveland News Items—The Apperson-Cleveland Co., Cleveland, Ohio, has moved to its new quarters at 2352 Euclid Avenue, where handsome salesrooms and a very complete service station have been prepared.

The Cleveland Automatic Machine Co. has purchased 3500 sq. ft. of land adjoining its present factory at 2269 East Sixty-fifth Street, where an addition will be built.

E. R. Johnstone has taken charge of the service department of the Guarantee Auto Repair Co., and will also be an instructor in the Ohio Automobile School which is owned by this company.

G. A. Guyman, for some years special representative of the G. M. C. truck in Ohio, has become associated with the Packard-Cleveland Co.

C. C. Burnet has taken charge of the used car department of the Hudson-Stuyvesant Motor Co. He was formerly sales manager of the used car department of the Cadillac Motor Co.

Baltimore Trade News—The Ford Motor Car Accessory Co., 1411 North Charles Street, Baltimore, Md., is the latest accessory house to enter the local field. I. R. Rollins is manager, and besides conducting the accessory factory the new concern will buy and sell used Ford cars. A repair department will be conducted with free service for their customers, and special prices will be made to new customers. The firm has also secured the agency of the Boston starter for the State of Maryland.

The Motor Car Co., Maryland and Mt. Royal Avenues, Baltimore, Md., distributor of the Overland and Willys-Knight, has found it necessary to acquire additional space and has leased a large building at 1018 Guilford Avenue, this city. The new building will be used exclusively for a repair and service department and contains 18,000 ft. of floor space, with the acquiring of which the Motor Car Co. has one of the largest plants in the South for the handling of business. Cuba, Porto Rico and South American points are supplied by this firm.

The Tire Mart, F. Morrison Boyd, president, Baltimore, Md., has acquired the agency of the Gordon and Ideal tires, manufactured by Gordon Tire & Rubber Co., Canton, Ohio. D. C. Turnbull has joined the Tire Mart sales force.

The Baltimore Oil Engine Co., Baltimore, Md., has been incorporated under the laws of the State of Delaware and will establish a large plant for the manufacture of internal combustion oil engines under the Wygodsky system. A. W. Gieske of Baltimore is president of the company.

The Rutherford Tire Co., Rutherford, N. J., has leased 1950 Linden Avenue, Baltimore, Md., and will establish a branch.

The Rowan Electric Mfg. Co., Baltimore, Md., has been incorporated with \$25,000 capital stock by J. S. Rowan, 208 North Holliday Street, B. H. Cram and A. B. McElderry, to manufacture, buy and deal in an automobile starter, valves, etc.

Missouri News Items—The Diamond Motor Car Co., St. Joseph, Mo., has taken over the \$15,000 garage and salesroom of the St. Joseph Automobile Co. at Eleventh Street and Frederick Avenue. The St. Joseph company probably will be disbanded, although no definite announcement has been made. It formerly held the agencies for the Hudson, Maxwell and Marmon cars, the Detroit electric, and the G. M. C. truck in northwest Missouri and northeast Kansas. The Hudson agency has been taken over by the Diamond company and the G. M. C. truck by the Holliday Motor Co. Disposition of the other agencies has not been announced.

L. W. Smith, who was manager of the

St. Joseph company, will be associated with the new company.

The Farmer Auto Co., agent in this territory for the Ford line, will move into the quarters made vacant by the moving of the Diamond company.

The Franklin Motor Car Co., Kansas City, will move in the near future from its present location, 3340 Main Street, to new quarters recently leased at 1916-18 Grand Avenue. The company's storage and salesrooms will be practically doubled by the change.

Several changes in locations have been made by Kansas City distributing agencies within the past few weeks. The Bush-Morgan Motor Co., agents for the Paige, has leased the three-story building at 1508-10 Grand Avenue, formerly occupied by the Moriarty Motor Co. That company has moved to the new four-story building constructed for it at Twenty-second Street and Grand Avenue.

Hall Bros. & Reeves, agents for the Bull tractor, have taken the building at 1526 McGee Street. The Chalmers company factory branch has taken new sales quarters at 1506-8 McGee Street, and the factory branch of the Chandler company will move to 1830 Grand Avenue. The R-C-H Co. also has taken new quarters, now being located at 1714 Grand Avenue.

Missouri Haynes Co., Kansas City distributor for the Haynes, Marion and Paterson cars in this territory, will move to larger quarters at the southwest corner of Sixteenth Street and Grand Avenue. The Serlis Motor Car Co. also will occupy the same building.

The Serlis Motor Car Co. is the recently organized distributor for the Briscoe there and has maintained temporary quarters at 1702 Grand Avenue. E. L. Reed, formerly sales manager of the Pathfinder agency in Los Angeles, heads the new concern.

Takes Over Chevrolet Retailing in S. Cal.—An important deal in southern California motor circles was completed yesterday when the Chevrolet Sales Co. officially took over the retail distribution of the Chevrolet in that territory. The new company has strong financial backing and is closely allied with the Chevrolet Motor Co. of California which controls the entire Pacific Slope and the Islands of the Pacific.

R. C. Durant, who is identified with the larger corporation, also becomes a prominent figure in the retail corporation. S. F. Seager, who is well known on the Pacific coast on account of his connection with the Oldsmobile company which controls the Coast territory, is another official prominent in the affairs of the new corporation. Both Durant and Seager will continue in the other corporations while the retailing of cars throughout the territory will be entrusted to a corps of trained men.